LIBRARY
UNIVERSITY OF
CALIFORNIA
SAN DIEGO

THE UNIVERSITY LIBRARY
UNIVERSITY OF CALIFORNIA, SAN DIEGO
LA JOLLA, CALIFORNIA

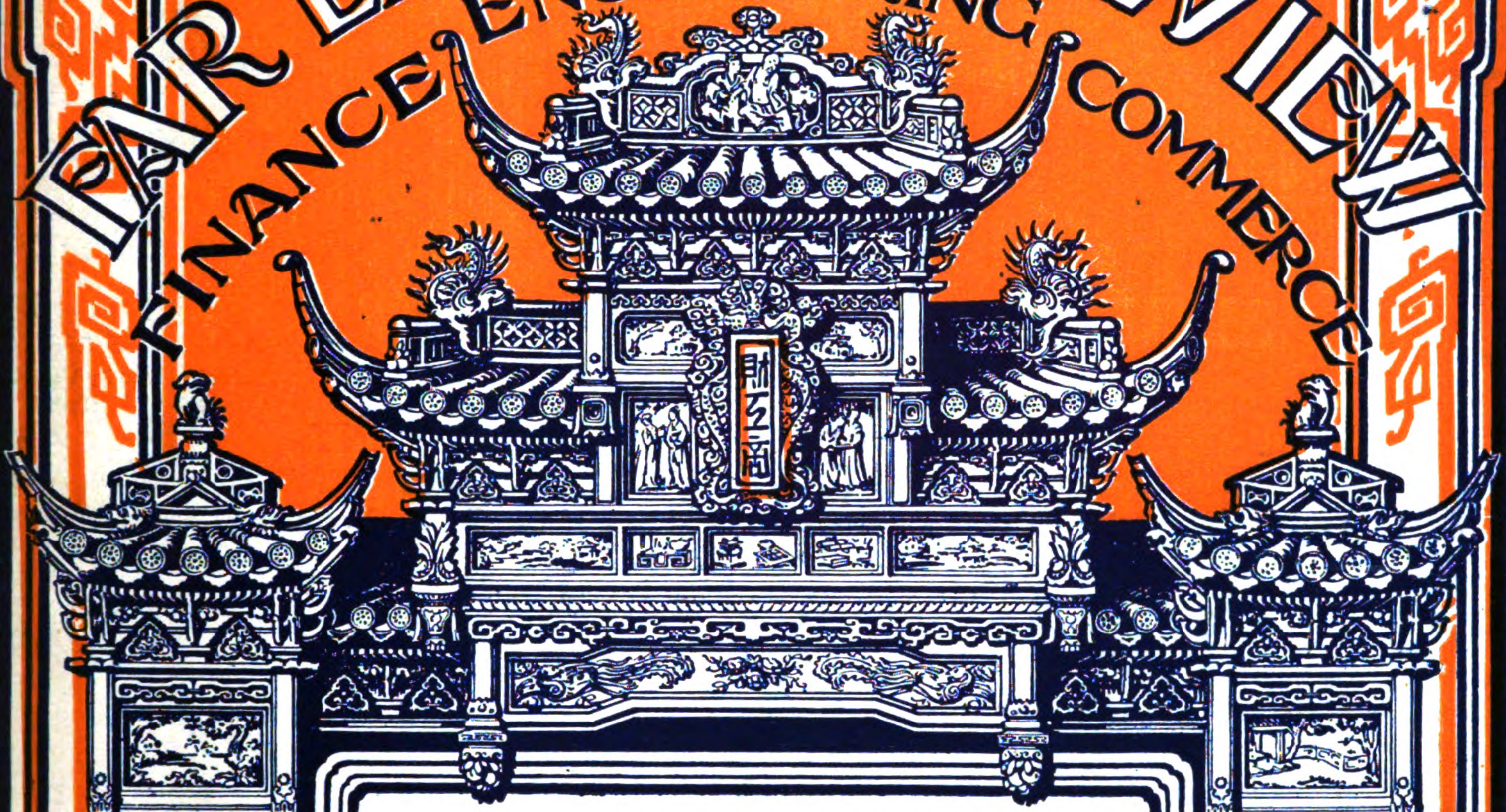
HC
411
.F2
v. 18
no. 7-12.

大正七年七月十日第三種郵便物認可

P.P. 9470. af.

THE FAR EASTERN REVIEW

FINANCE ENGINEERING COMMERCE



上海仁記路第五號

遠東時報

NEW N. Y. K. STEAMERS

CENTRAL WORKSHOPS, F. M. S.

BUILDING ACTIVITY IN CHINA

KEEPING PEACE IN THE PACIFIC

RADIO DEVELOPMENT IN JAPAN

FAR EASTERN MOTORS

Vol. XVIII | JULY, 1922 | No. 7

A. STAYLER.

We make KEWANEE Regrinding Valves so sturdy that they seldom need to be reground

High-Duty Metal is the best mixture we have yet evolved to combine strength, ductility, density and hardness.

Convex Discs and Seats insure a continuous contact all the way round the seat.

FIG. W3253
GLOBE CHECK VALVE

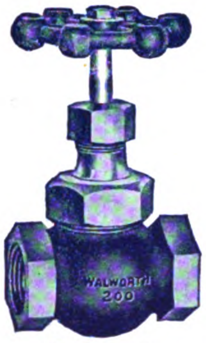


FIG. W3251
GLOBE VALVE

FIG. W3261
FLANGED GLOBE VALVE

FIG. W3252
ANGLE VALVE

They can be reground on the line without disconnecting.

Valve bodies and all assembled valves are tested with 400 lbs. Hydraulic Pressure above and below the seat.

The KEWANEE Regrinding Valve is a Quality Valve.

WALWORTH MANUFACTURING COMPANY

Oldest continuous manufacturers in the United States (since 1842) of a complete line of Valves, Fittings and Tools for steam, water, oil, gas, and air. Originators of the Famous "GENUINE WALWORTH STILLSON" Wrench and the "KEWANEE" Union.

Export Sales Agents: WALWORTH INTERNATIONAL COMPANY, New York City, U. S. A.

Foreign Sales Offices in All Principal Cities

For catalog, prices or information address

HENRY KATTEN

22 Kiukiang Road, Shanghai, China

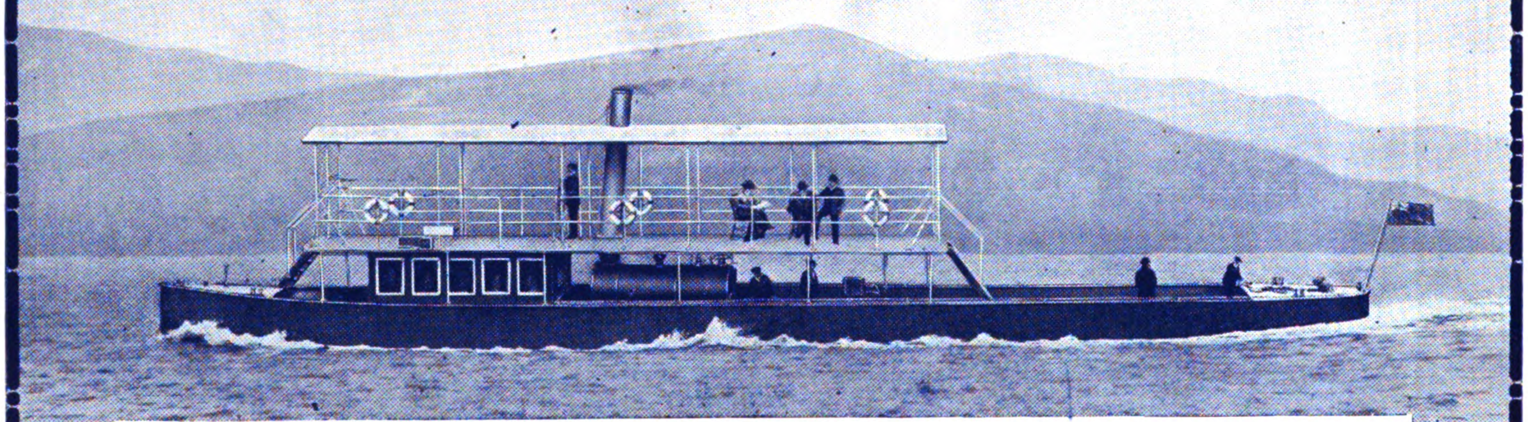
SHALLOW DRAUGHT LAUNCH—YARROW SYSTEM,

built by

YARROW & CO., LTD., Glasgow,

(formerly of Poplar, London).

Yarrows, Limited, of Victoria, British Columbia, Shipbuilders, Ship Repairers and Engineers, are associated with Yarrow & Co., Ltd., Glasgow.



Length, 160-ft.; Beam, 24-ft. 6-in.; Draft, carrying 40 tons 2-ft. 3-in.; Speed, carrying 40 tons 15 Statute miles an hour, burning wood fuel only

Vessel as above illustrated can be shipped whole to any part of the world.

Messrs. YARROW Construct Fast Passenger and Commercial Vessels, Shallow Draught Steamers, Tugs, etc., propelled by Sternwheels, Side Wheels, or Screws working in Tunnels fitted with Yarrow's Patent Balanced Hinge Flap.

RIELLEY, SIMMONS & MILNE, Agents, Shanghai.

FOUNDED, 1904

The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.

HEAD OFFICE: 5 JINKEE ROAD - - - - SHANGHAI, CHINA.

George Bronson Rea, *Editor and Publisher*

William Carter Rea, *Advertising Manager*

JAPAN OFFICE: H. C. Huggins, Representative, No. 12 Takagi-cho, Akasaka-ku, Tokyo.

NEW YORK: British and Colonial Press, Inc., 738 The Knickerbocker Building, Broadway and 42nd Street.

MANILA OFFICE: Fleming, Percy Smith and Seth, Roxas Building, Escolta.

CHICAGO: British and Colonial Press, Inc., 140 Dearborn St.

GREAT BRITAIN: Walter Judd, Ltd., 97 Gresham Street Bank, London, E.C.

SAN FRANCISCO: Leroy P. Boyce, Monadnock Building

SUBSCRIPTION IN CHINA: $10.00 Mexican, U. S. & Philippines Gold $5.00, Elsewhere $12.00 Mexican per annum

VOL. XVIII JULY, 1922 NO. 7

CONTENTS:

	PAGE
NEW N. Y. K. STEAMERS	*392
THE CENTRAL WORKSHOPS	*400
NEW TELEPHONE SYSTEM FOR MUKDEN	*403
TAYEH AND ITS INDUSTRIES	*405
Tokyo-Kobe Electric Railway	406
NEW CONCRETE WHARVES AT SINGAPORE	*407
THE CHARTERED BANK'S NEW BUILDING	*408
GLEN LINE'S NEW BUILDING	*410
NEW CHINESE HEAD POST OFFICE FOR SHANGHAI	*412
NEW CUSTOM HOUSE BUILDING FOR HANKOW	*413
NEW HOME OF THE "NORTH-CHINA DAILY NEWS"	*414
Netherlands East Indies Railways Electrification	414
ASIATIC PETROLEUM COMPANY'S OFFICES AT TIENTSIN	*415
THE HONGKONG AND SHANGHAI BANK'S NEW BUILDING	*416
PROGRESS VIEWS OF BANK BUILDINGS IN SHANGHAI	*417
Office Helps in China	417
New Cigarette Machine	*418
The Lungyen Steel Works	*418
EDITORIALS:	
Machinery Trade in China	419
Up to Northcliffe	421
The American Minister	*422
The New Pacific "Entente Cordiale"	424
The China Trade Act	424
The Situation in China	*425
Keeping Peace on the Pacific	427
For a Better Consular Service	428
KEEPING PEACE ON THE PACIFIC	*429
RADIO DEVELOPMENT IN JAPAN	431
THE FAR EASTERN MOTORS:	
Taxes, Motors and Roads in Japan	*437
Roads and Motors in South China	*440
Motor Omnibus Laws in Singapore	442
Safety Bus for Chinese Roads	*443
Good Roads in China	444
Suiping-Chowkiakow Motor Road	*445
Market for Solid Tyres in Tientsin, China	445
Motors and Roads in the Philippines	*446
Motors and Roads in Siam	*448
Modern Fire-Fighting Apparatus	*452
Aviation in Japan	*453
Smallest Airship in the World	*454
Twenty Years of Motor Car Devotion	*455
Tire Bruises	*455
Motor Vessels Developing Siberian Trade	*457

***Illustrated with Maps or Photographs*

Entered at the U.S. Postal Agency, Shanghai, China, as second-class matter. Registered at the Chinese Post Office as a Newspaper. Entered at the Japanese Post Office as a Newspaper.

ALPHABETICAL LIST OF ADVERTISERS

Admiral Line, The ... 76
Allen & Co., Ltd., Edgar ... 33
American LaFrance Fire Engine Co. Supt
American Locomotive Sales Corp. ... 25
American Tool Works Co. ... 1
Andersen, Meyer & Co., Ltd. ... 28
Asbestos Shingle, Slate & Sheathing Co. 17
Ashton Frost & Co., Ltd. ... 21
Asiatic Review, The ... 72
Atlantic, Gulf & Pacific Co. of Manila 460
Attwater & Sons ... 48
Avery, Ltd., W. & T. ... 11

Babcock & Wilcox, Ltd. ... 31
Baldwin Locomotive Works ... 65
Bank of Chosen ... 52
Bank of Communications ... 57
Banque de l'Indo-Chine ... 54
Bank of Taiwan, Ltd. ... 55
Bliss Co., E. W. ... 27
Brill Co., J. G. ... 39
British-American Tobacco Company (China), Ltd. ... 62
Brunswick Refrigerating Co. ... 71
Bucyrus Company ... 9
Butterfield & Swire ... 461

Canada Carbide Co. ... 15
Chartered Bank of India, Australia & China ... 48
Chicago, Milwaukee & St. Paul Railway 15
Clough, S. W. ... 4
Cole Marchant & Morley, Ltd. ... 74
Consolidated Steel Corporation ... 14
Craig & Donald, Ltd. ... 31

Dai-Ichi Ginko ... 60
Dai Nippon Brewery Co. ... 74
Dennis Bros., Ltd. ... Supt.
Diamond Power Specialty Corporation 63
Dixon Crucible Co., Joseph ... Supt.
Dorman Long & Co., Ltd. ... 3
Drysdale & Co., Ltd. ... 71

Electricity Department, S. M. C. ... 4
English Electric Co., Ltd. ... 8
Evans & Sons (Wolverhampton), Ld., Joseph ... 2

Fuji Gassed Spinning Co. ... 10

Gleniffer Motors, Ltd. ... Supt.
Green Island Cement Co., Ltd., The ... 20
Greenfield Tap & Die Corp. ... 11
Greening & Sons, Ltd., N. ... 4

Hasler Telegraph Works ... 21
Heap & Co., Ltd., Joshua ... 51
Hongkong Rope Manufacturing Co. ... 20
Hongkong & Shanghai Banking Corporation ... 61
Hongkong & Whampoa Dock Co., Ld. 30
Hotel Statler Co. ... 49
Humber, Ltd. ... Supt.

Imperial Japanese Government Railways ... 66, 67
Industrial Bank of Japan ... 56
International Banking Corporation ... 53

Japan Sugar Mfg. Co. ... 6
Jardine, Matheson & Co., Ltd. 12 & Supt.
Jeffrey Manufacturing Co., The ... 63
Jones & Lamson Machine Co. ... 51
Jugo Ginko ... 54

Kanegafuchi Spinning Co., Ltd. ... 10
Kawasaki Dockyard Co., Ltd. ... 35
Kellogg Switchboard & Supply Co. ... 71
Kelvin, Bottomley & Baird, Ltd. ... 13
Kokusai Kisen Kaisha ... 43
Koster Co., The ... 39

London Directory Co., Ltd. ... 74
Low & Sons, Ltd., Archibald ... 75

Manning, Maxwell & Moore, Inc. ... 72
Mather and Platt, Ltd. ... 7
Metropolitan Vickers Electrical Co., Ltd. ... 75
McClintic-Marshall Products Co. ... 27
McConway and Torley Co. ... 21
Mills & Son Ltd., Edwin ... 63
Mitsubishi Bank ... 59
Mitsubishi Iron & Steel Co., Ltd. ... 38
Mitsubishi Marine & Fire Ins. Co., Ld. 38
Mitsubishi Shoji Kaisha ... 18
Mitsubishi Warehouse Co. ... 38
Mitsubishi Zosen Kaisha, Ltd. ... 36
Mitsui Bank ... 59
Mitsui Mining Co. ... 18
Mitsui Bussan Kaisha ... 26
Motor Rail & Tram Car Co. ... 41
Mount Vernon Car Mfg. Co. ... 9
Mustard & Co. ... 4

New Engineering & Shipbuilding Works ... 34
Nippon Menkwa Kabushiki Kaisha ... 50
Nippon Yusen Kaisha ... 46, 47
Nobel Industries, Ltd. ... 22

Okura & Co. (Trading), Ltd. ... 24
One Hundredth Bank, Ltd., The ... 60
Osaka Shosen Kaisha ... 44

Pacific Steamship Co. ... 76
Pittsburgh Steel Co. ... 19
Pittler Turret Lathe ... 460
Priestman Bros., Ltd. ... 462
Pooley & Son, Ltd., Henry ... 2
Reay Gearworks, Ltd. ... 76
Republic Truck Sales Corp. ... Supt.
Royal Bank of Canada ... 61
Ruston & Hornsby, Ltd. ... 21
Ryerson & Son, Joseph T. ... 5

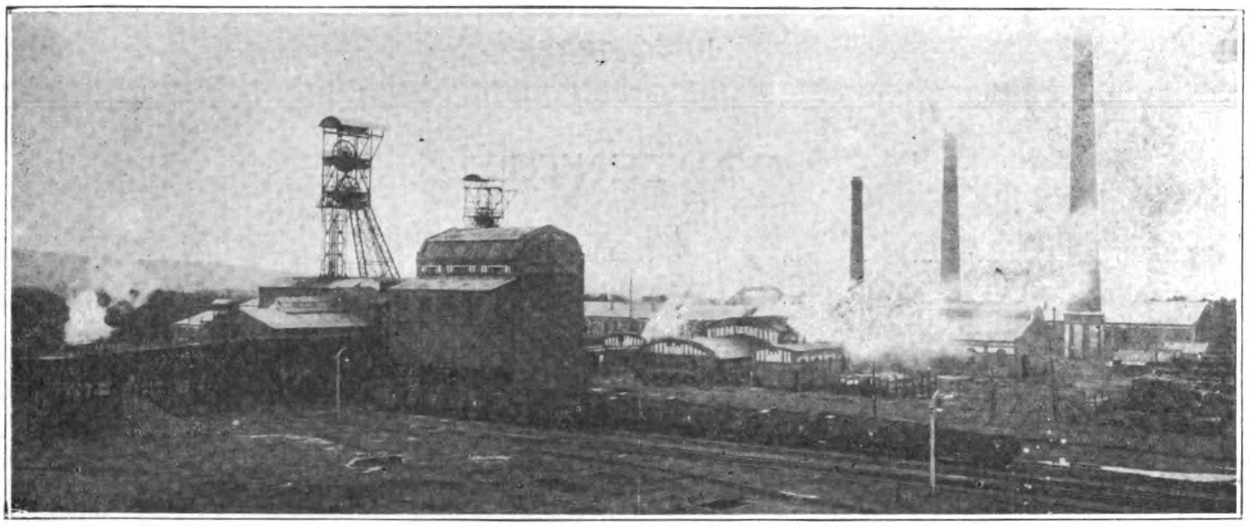
Sale & Frazar, Ltd. ... 16
Scottish Tube Co., Ltd. ... 13
Shanghai Dock & Eng. Co., Ltd. ... 32
Shanghai Municipal Council ... 4
Shantung Railways ... 70
Siebe Gorman & Co., Ltd. ... 7
Simons & Co., Ltd., Wm. ... 19
South Manchuria Railway Co. 64, 68, 69
Standard Oil Co. of N. Y. ... 29 & Supt.
Stewarts & Lloyds, Ltd. ... 15
Sumitomo ... 58
Sumitomo Bank, Ltd. ... 58
Superheater Co., The ... 19

Thornycroft & Co., John I. ... 1
Toshin Soko ... 40
Toyo Kisen Kaisha ... 45
Transatlantische Handels-Kompagnie, m.b.h. ... 19
Trimont Manufacturing Co. ... 7

United Brassfounders & Engineers, Ltd. ... 61
United Cigarette & Machine Co. ... 41
United States Steel Products Company ... 23, 37, Back Cover

Walworth International Co. ... Cover
Werf Gusto ... 36
Whittall & Co., Ltd., J. ... 6
Wild & Co., M. B. ... 9
Williams & Co., J. H. ... 41

Yarrow & Co., Ltd. ... Cover
Yokohama Dock Co. Ltd. ... 33
Yokohama Specie Bank, Ltd. ... Cover



The Tzuchuan Colliery, Shantung

TZUCHUAN COAL

The Cheapest and Best Coal Mined in the Far East

Annual Output: 600,000 tons.
The Coal is washed, screened, and classified for the market into five grades, viz., Lump, Slack, and Washed Coal Nos. 1, 2 and 3.
Tzuchuan Coal contains a large amount of coke, with only a small amount of ash, and has a heating capacity of 7,500 calories.
Tzuchuan Coal, which rivals the best Cardiff Coal, is highly recommended for Coke and Briquette manufacture, for Boiler and Marine use and for General Domestic use.
Tokuyama Briquette Factory, Yawata Iron and Steel Works, and many other important works in Japan and China are constant purchasers.
The Wharves at Tsingtao are well accommodated as Coaling Stations for Coast and Ocean liners.

For further information please apply to the

SHANTUNG RAILWAY ADMINISTRATION

Cable Address: "SANTETSU" TSINGTAO, CHINA Codes: A.B.C. 5th Ed. & A.1.

SPEED

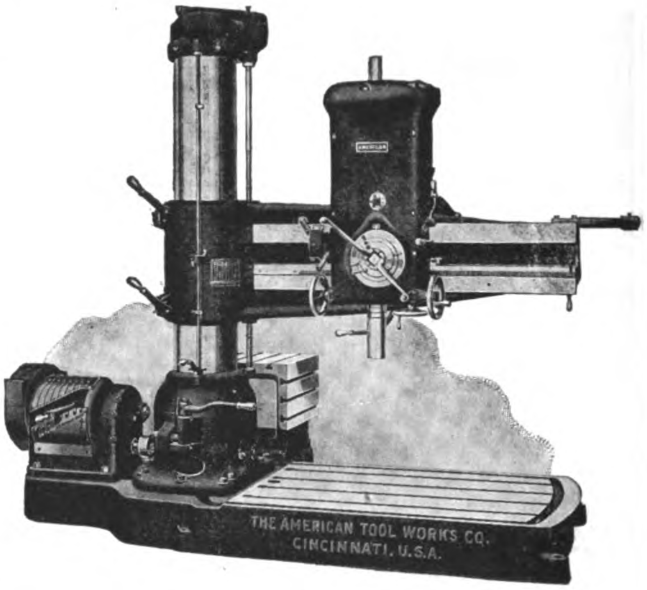
600-1½ inch holes per hour through 2 inch steel plate is not an excessive drilling rate for the 6 ft.

"AMERICAN"
TRIPLE PURPOSE RADIAL

No other standard Radial Drill has the great power, the wide range of speeds and feeds and the many refinements of the "American."

The **"American" Triple Purpose Radial** will produce your work faster, better and at lower cost.

WRITE FOR EFFICIENCY BULLETIN



Agents: **Andersen, Meyer & Co., Ltd., Shanghai and Manchuria**
Horne Co., Ltd., Tokio, Japan
H. P. Gregory & Co., Sydney & Melbourne
Pacific Commercial Co., Manila, P.I.
Honolulu Iron Works, Honolulu, H.I.

THE AMERICAN TOOL WORKS COMPANY

Lathes-Planers CINCINNATI, U.S.A. Shapers-Radials

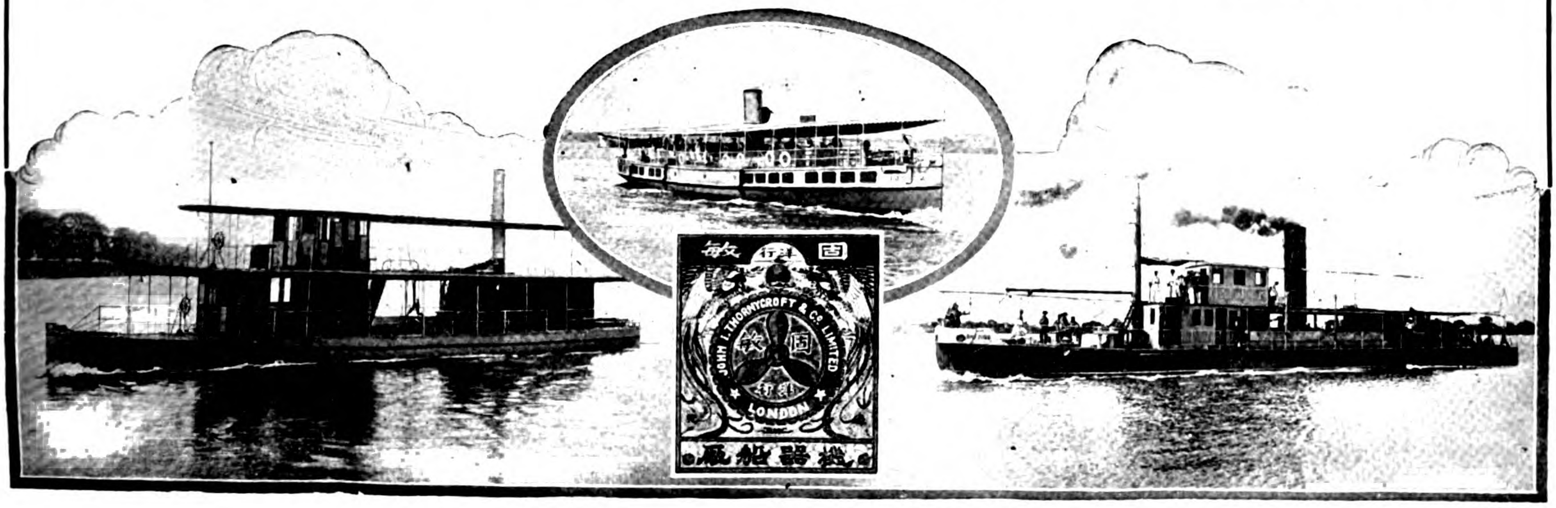
JOHN I. THORNYCROFT AND CO., LIMITED

ENGINEERS & SHIPBUILDERS

All types of Shallow Draft, River and Ocean Craft, Steam or Motor Propelled, Side Wheel, Stern Wheel or Tunnel Stern, War Vessels, Submarines, Cruisers, Cargo and Passenger Vessels to 5,000 tons, Motor Boats to 40 knots.

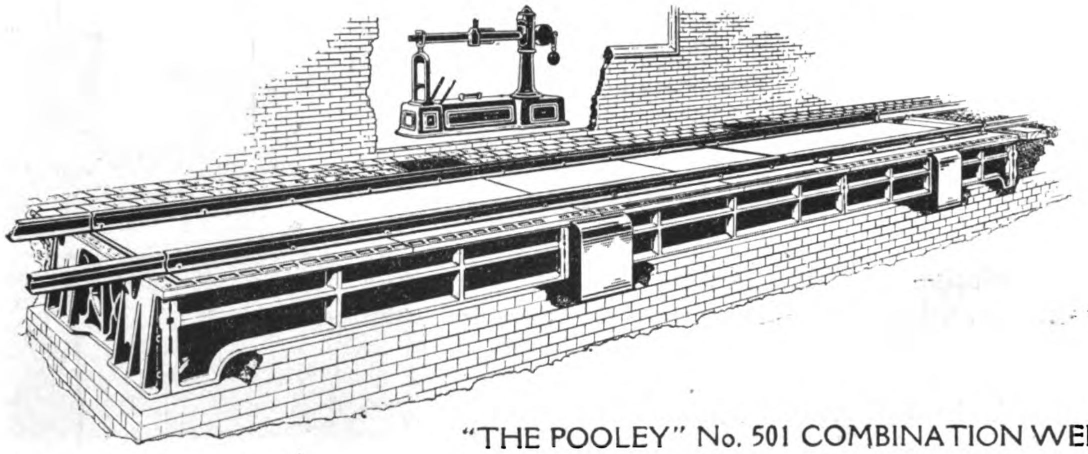
Water Tube Boilers, Steam Turbines, Marine Engines, Oil Fuel Gear, Propellers. The "Thornycroft" Oil Fuel Sprayer, Marine Motors, from 15bhp. for Petrol or Paraffin, Stationary Oil Engines for Lighting, Pumping, and Power Plants.

10 Kiukiang Road, SHANGHAI :: Thornycroft House, Westminster, London, S.W.1. & Southampton, England



POOLEY

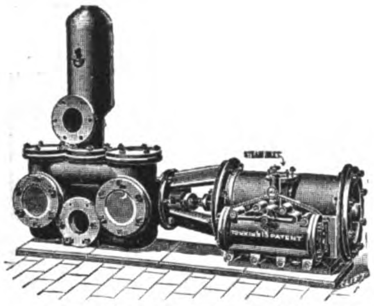
WEIGHING MACHINE & WEIGHBRIDGE MAKERS



"THE POOLEY" No. 501 COMBINATION WEIGHBRIDGE, CAPACITY 70 TONS, SPECIALLY DESIGNED FOR CHINA.

HENRY POOLEY & SON L^TD
JOHN BRIGHT ST
BIRMINGHAM
ENGLAND.

P.A. 123.



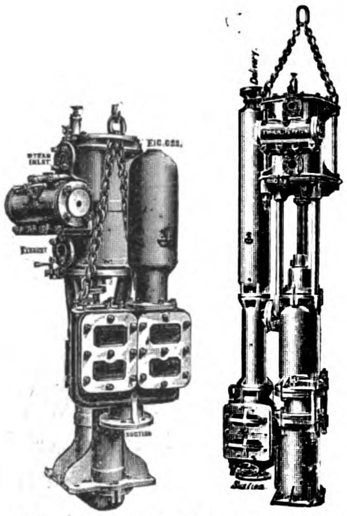
STEAM PUMP for General Purposes

WE MANUFACTURE

PUMPS

FOR EVERY PURPOSE

To be worked by HAND, STEAM, BELT, WIND, WATER or ELECTRIC POWER.



SINKING PUMPS for COLLIERIES, MINES, Etc.

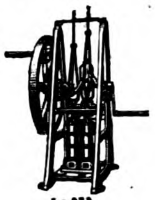
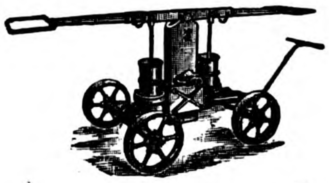


Fig. 223.

Fig. 168.



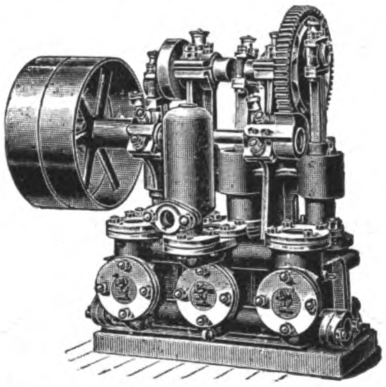


Fig. 121.

Write for "Eastern" List.

JOSEPH EVANS & SONS

(WOLVERHAMPTON) LTD

CULWELL WORKS,

WOLVERHAMPTON, ENGLAND.

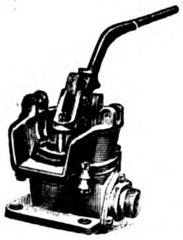


Fig. 185.

Agents for China

J. WHITTALL & CO., LTD.

16 Victoria Terrace, Tientsin — 12 Nanking Road, Shanghai — 33 Ta Juan Fu Hutung, Peking

Stocks Kept in Tientsin and Shanghai.

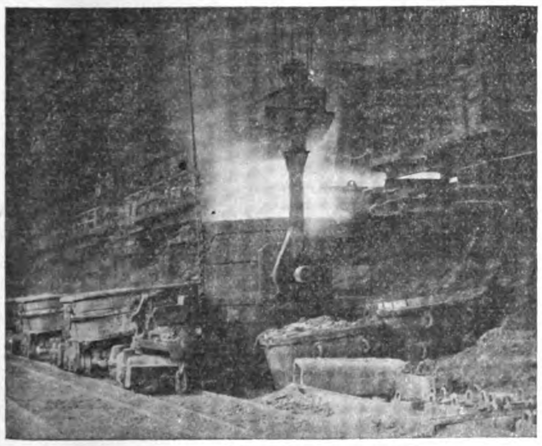
DORMAN, LONG & Co., Ltd.

Steel Manufacturers,
Bridge Builders & Constructional Engineers,

MIDDLESBROUGH, ENGLAND.

Telegraphic Address:
"DORMAN-MIDDLESBROUGH."

Codes —
BENTLEY'S; A.B.C. (5th and 6th Editions) and WESTERN UNION (Universal & 5 Letter).



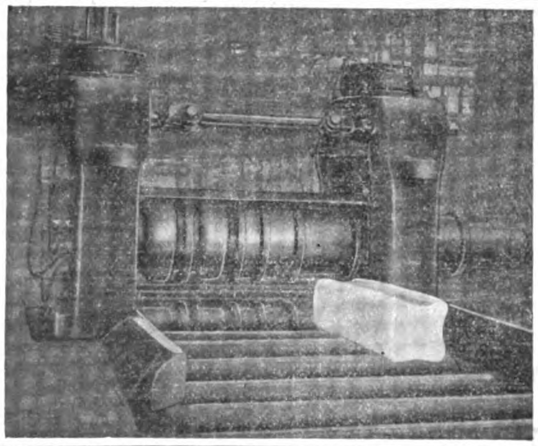
Britannia Steelworks,

MIDDLESBROUGH.

Open-Hearth STEEL JOISTS, ANGLES and OTHER SECTIONS, RAILS.

Open-Hearth STEEL BARS in long lengths suitable for

FERRO-CONCRETE WORK, BILLETS AND BLOOMS.



Redcar Iron and Steel Works, Redcar.

Steel Works and Rolling Mill Dept.

Plate Mills capable of Rolling all Plates for **Shipbuilding and Engineering** purposes, from $\frac{3}{16}''$ to $1\frac{1}{2}''$ thick, fulfilling the requirements of British Standard Tests, Board of Trade, Admiralty, Lloyds, etc.

Universal Plates with Rolled Edges 12″ to 42″ wide up to 90-ft. long.

Clarence Steel Works and Rolling Mills,

PORT CLARENCE.

High-class Steel in quality from Dead Soft to 1.25 per cent. Carbon for the manufacture of Wire, Springs, Files, Saws, Forgings, Stampings, Rifle Barrels, Agricultural Implements, etc. Conductivity Steel to stand General Post Office, India Office and British Railway Tests.

Electrically Melted Steels of all Carbons.

NICKEL ALLOY STEEL.

Flange and Bulb Head Rails, Billets, Slabs, etc.

Ayrton Rolling Mills,

MIDDLESBROUGH.

Galvanized Corrugated and Plain Sheets,

Ridging, Gutters, Downpipes, Fountain Heads, etc.

Ordinary Galvanized Fittings kept in Stock.

Cleveland Wire Mills,

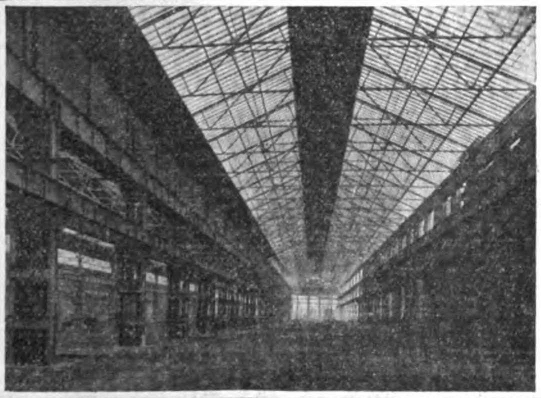
MIDDLESBROUGH.

Wire Rods and all kinds of Wire for all purposes. Telegraph & Telephone Wire. Annealed Core Wire. Galvanized Seizing Wire. Galvanized Rigging Wire. Galvanized & Varnished Fencing Wire. Galvanized Strand & Barb Wire. Galvanized Cable Wire.

Galvanized Patent Steel Hawser Wire to Lloyd's Tests.

Bright Patent and Plough Steel Rope Wire.

The Mills can supply the **longest single length** of Rods or Wire without weld or joint of anyone in the Trade.



Constructional Department,

MIDDLESBROUGH.

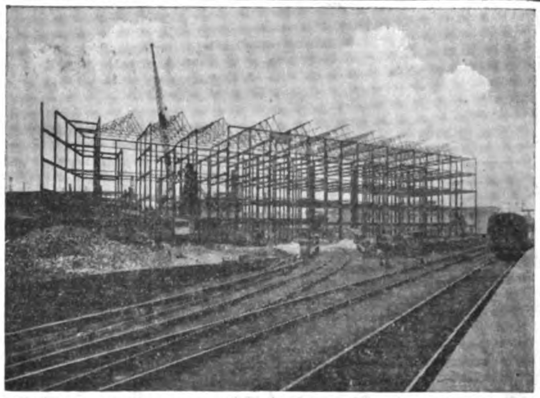
STRUCTURAL STEELWORK

for all purposes.

Speciality:

STEEL FRAME BUILDINGS

for home and abroad.



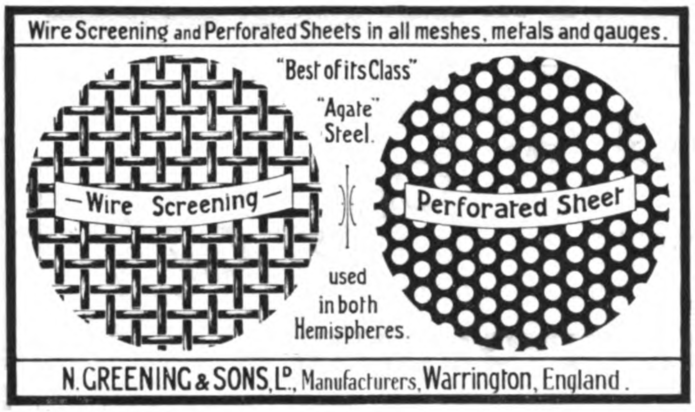
AGENTS:—

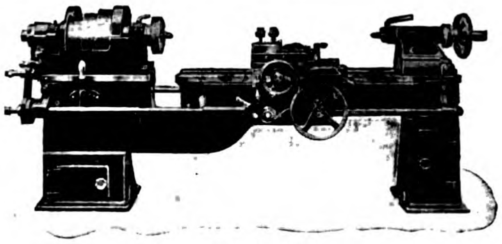
REPRESENTATION for BRITISH MANUFACTURERS, LTD.

CHING MING BUILDINGS, BRITISH CONCESSION, HANKOW.

43 KIANGSE ROAD, SHANGHAI.

REGINES BUILDINGS, LEGATION STREET, PEKING.





HEAVY

DUTY

LATHES

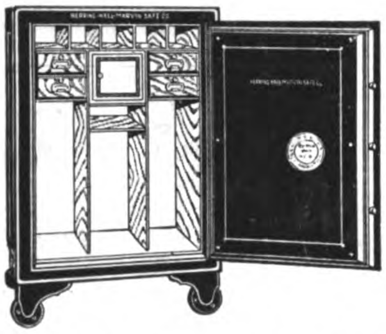
7-in. and 9-in. Centres

HIGH-CLASS MACHINES AT MODERATE PRICES

S. W. CLOUGH

REDBURN LATHE WORKS

SHIPLEY, Eng.



Unfailing Protection For Your Most Valued Possessions

HERRING-HALL-MARVIN

Safes and Bank Vaults

All sizes from the smallest Home Safe to the largest Bank Vaults, Key-Lock or Combination.

MUSTARD & COMPANY

Sole Agents for China, Hongkong and Macao.

Shanghai, Tientsin, Hankow, Hongkong, Canton, Harbin.

THE

MUNICIPAL ELECTRICITY DEPARTMENT

HAS RECEIVED DEMANDS FOR

ELECTRIC POWER

AMOUNTING TO

80,000 HORSE POWER

AND PLANS TO INCREASE ITS GENERATING PLANT TO A CAPACITY OF

180,000 HORSE POWER

DO **YOU** **THINK**

IT IS POSSIBLE TO MAKE YOUR OWN POWER AT A COST WHICH CAN COMPETE

? **WITH THE** **CHEAP RATES** **MADE AVAILABLE** **?**

BY THE OPERATION OF THIS VAST MODERN POWER PLANT?

ASK

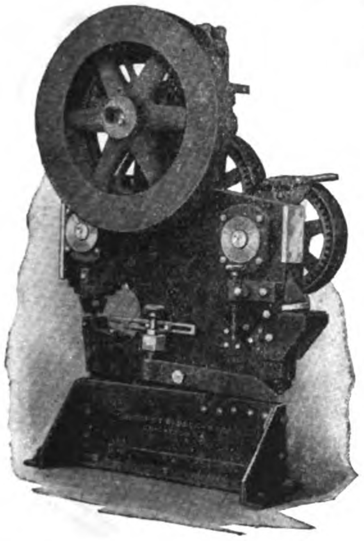
THE POWER DEPARTMENT, FOOCHOW ROAD, SHANGHAI

TELEPHONE FOR AN APPOINTMENT TO CENTRAL 283.

RYERSON

Quadruple Combination Punching and Shearing Machine

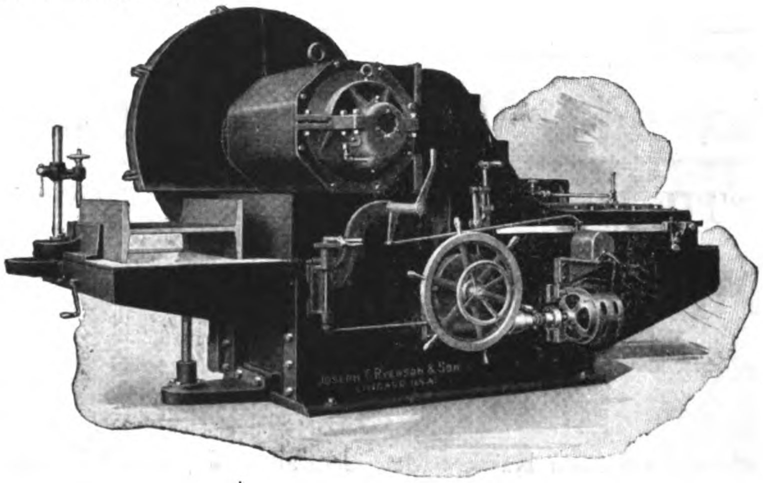
U. S. and Foreign Patents



The Ryerson Quadruple Combination Punching and Shearing Machine embodies four single tools in one, handling punching, shearing of plates, round and square bars, cutting of angle and tee iron, as well as coping and notching work. All of this can be done without interchanging the attachments for the various operations or having to maintain a number of single machines for each operation. This machine is furnished arranged for either belt drive or direct motor drive. We also manufacture this type of punch and shear in single units, or in different combinations to meet special conditions.

Ryerson Universal High Speed Friction Saw

U. S. and Foreign Patents



The Ryerson High Speed Friction Saw is designed for rapid cutting of steel shapes of all descriptions. The use of the High Speed Friction Saw in railroad shops and frog and switch shops is a recognized necessity for the efficient and rapid cutting of rails, beams, angles, channels, tees, zees, round bars, etc., as well as the various special sections which are being employed in steel construction. This saw will cut different shapes in rapid succession without the necessity of interchanging any attachments or clamping the material. A 24″ I-beam can be cut in 50 seconds. This saw is made in various sizes, from No. 1 to No. 5, with capacity to cut from the smallest to the largest sections rolled.

Write for complete descriptive bulletin. A bulletin on any particular machine, or a complete catalogue on all Ryerson Machines, will be mailed at your request.

JOSEPH T. RYERSON & SON

NEW YORK
BUFFALO

ESTABLISHED 1842
CHICAGO, ILL., U. S. A.

ST. LOUIS
DETROIT

Cable Address: Ryson, Chicago. Telegraphic Codes: Western Union, Lieber's, A. B. C. (5th Edition), Bentley's, Ryerson.

12

TRADE MARK S

CABLE ADDRESS: "SUGAR," TOKYO
CODE: A.B.C. 5TH EDITION
Head Office:
No. 12 Sanchome, Kakigara-Cho,
Nihonbashi-Ku, TOKYO

RAW SUGAR REFINED

THE JAPAN SUGAR CO., LTD.
(DAI NIPPON SEITO KABUSHIKI KAISHA)
CAPITAL: YEN 18,000,000; PAID-UP: YEN 12,000,000

TRADE MARK S

J. WHITTALL & CO., LTD.

TIENTSIN — ENGINEERS AND MERCHANTS SPECIALISTS IN — PEKING

MINING, RAILWAY AND TEXTILE MACHINERY

Agents in North China for:

HADFIELDS, LTD.
Mining and Light Railway Material of all Kinds

BELLIS & MORCOM, LTD.
Engines, Turbines, Condensers and Air Compressors

CROMPTON & COMPANY, LTD.
Electrical Generators and Motors

JOHNSON & PHILLIPS, LTD.
Electrical Cables and Transformers

M. B. WILD & COMPANY, LTD.
Winding and Hauling Machinery

HOWARD & BULLOUGH, LTD.
Textile Machinery and Cotton Mill Accessories

WARRINGTON WIRE ROPE WORKS, LTD.
Steel Wire Ropes

JOSEPH EVANS & SONS, LTD.
Mining Pumps

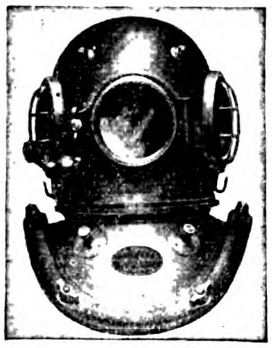
LEWIS BERGER & SONS, LTD.
Paints

Codes : Engineering 2nd Ed. A.B.C., 5th Ed. Bentley's: Kendall's: Scholfields: Private

Telegrams: "*Whittal.*"

DIVING APPARATUS

OF ALL PATTERNS IN USE TO-DAY



Contractors to . . .

BRITISH ADMIRALTY
WAR OFFICE,
INDIA OFFICE,
TRINITY HOUSE, etc.

Prompt shipment of complete sets and accessories of every description

Immediate Delivery

ALSO MAKERS OF

SMOKE HELMETS for Steamships, Oil Tankers, Oil Companies, Chemical Works, etc.
OXYGEN BREATHING APPARATUS For Rescue Work in Mines
MEDICAL OXYGEN APPARATUS for Resuscitation purposes
Oxygen Supplies of every description
Air Compressors Vacuum Pumps

SIEBE, GORMAN & CO., LTD.
187 WESTMINSTER BRIDGE ROAD,
LONDON, ENGLAND

Agents for Japan and South China: MITSUI BUSSAN KAISHA

Cables: "SIEBE, LONDON."

Codes used: A.1, A.B.C. (5th Edition), Western Union, Engineering & Private

TRIMO WRENCHES

Pipe Wrench

Supplied with steel frames that do not break, nut guards that keep the adjusting nut from being turned accidently in close quarters, and inserted jaws in end of handle that can be removed when worn, saving the handle.

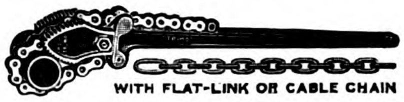
There are other superior points that every user of Trimo Pipe Wrenches knows—all for economy to the user.

Nut Wrench

Trimo Pipe Cutter

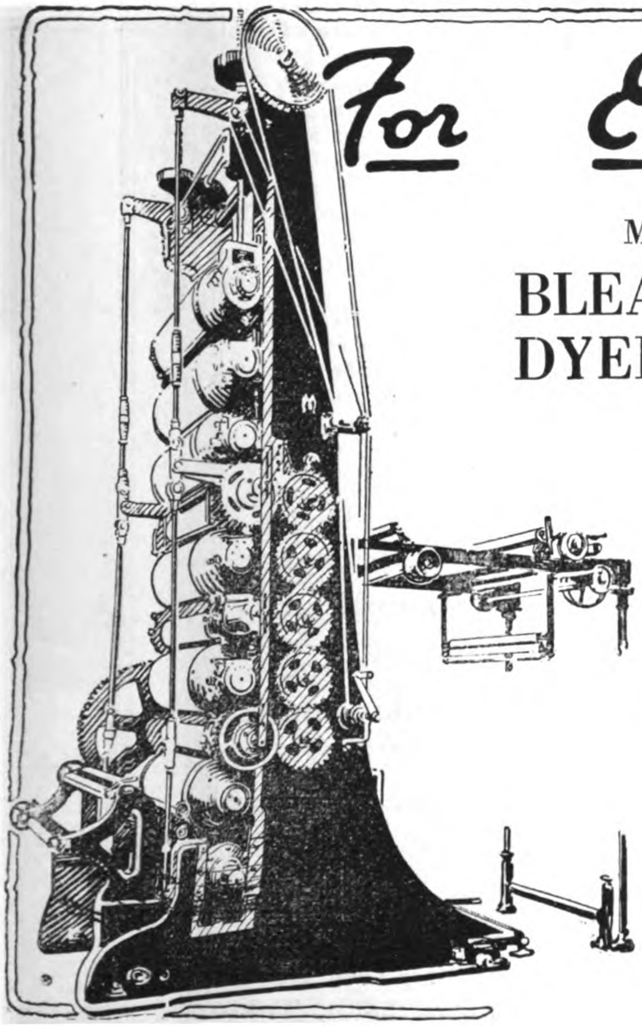
As a 1 or 3 Wheel Cutter

Trimo Chain Wrench



WITH FLAT-LINK OR CABLE CHAIN

TRIMONT MFG. CO.,
Roxbury (Boston), Mass.



For Eastern Requirements

MODERN MACHINERY FOR

BLEACHING, PRINTING, DYEING and FINISHING

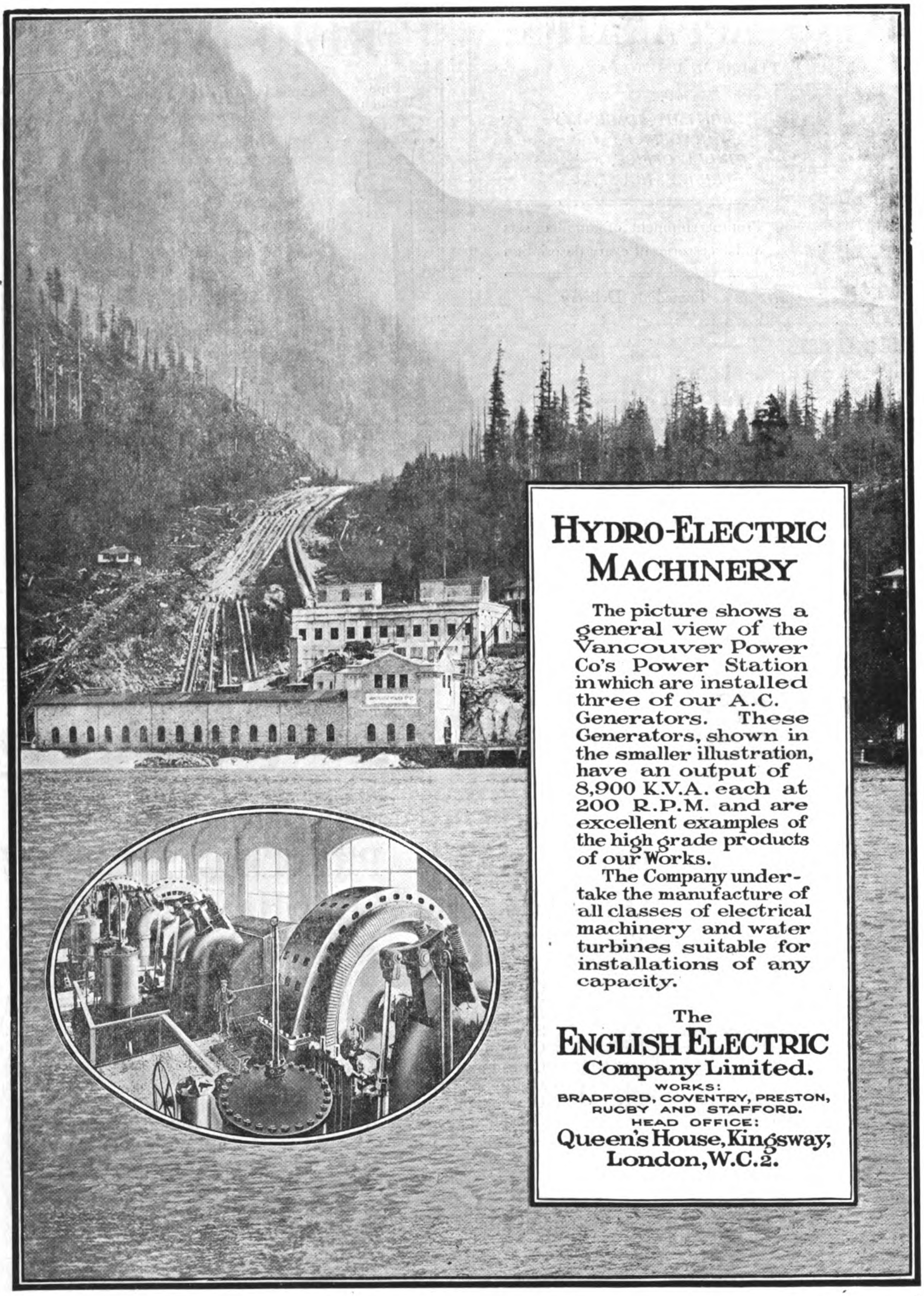
SOME SPECIALITIES:

Shearing and Moting Machines.
Mather Kiers Mercerising Ranges.
High-Speed Stentering Ranges.
Spray Damping Machines.
Calenders of all kinds and for all purposes.
Cotton and Paper Bowls Finishing Ranges.
High-Speed Beetling Machines.
Duplex and Intermittent Printing Machines.
Complete Plants for treating all classes of Cotton and Silk Goods.
Electrolitic Plants for the production of Sodium Hypochlorite for Bleaching and other purposes.

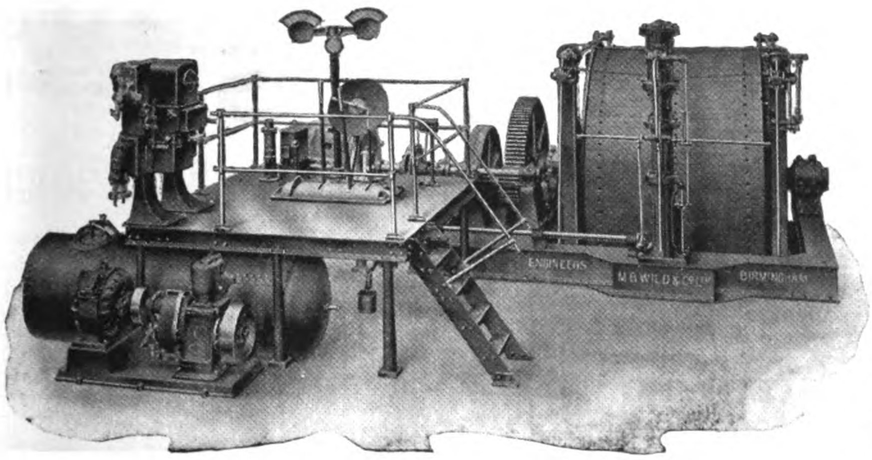
MATHER & PLATT, LTD.

Engineers
Park Works, Manchester, England
and
14 Great Smith Street, London, S.W., England

47 Szechuen Road, Shanghai



China Office: JARDINE, MATHESON & CO., LTD., Engineering Dept., 8a Yuen-Ming-Yuen Road, Shanghai
Japan Office: ENGLISH ELECTRIC CO., LTD., 3 Itchome, Uchisaiwaicho, Kojimachi-Ku, Tokyo



ONE of the recent productions turned out from our works. Every machine, in fact every part, is carefully designed to efficiently and economically perform its particular duties.

Your requirements will have our careful study, and designs and full particulars submitted upon application.

M. B. WILD & CO., LTD.

NECHELLS, BIRMINGHAM, ENGLAND

Telephone: Birmingham, East 208.

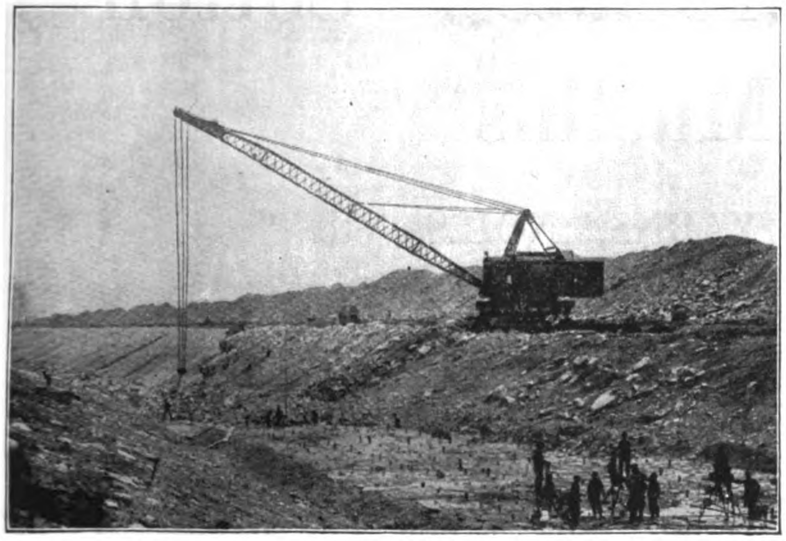
Telegrams: 'Hauling,' Birmingham.

Codes: A B C (5th Edition), Liebers, Bentleys.

BUCYRUS

TRADE-MARK Registered

DRAG-LINE EXCAVATING MACHINERY



The Electric Dragline Excavator is Digging a Canal in Blasted Rock

If you are interested in irrigation or drainage work, it will pay you to investigate Bucyrus dragline excavators.

40 years of experience in building excavating machinery are incorporated in our steam and electric shovels, dragline excavators, hydraulic and placer dredges.

BUCYRUS COMPANY

South Milwaukee, Wisconsin, U.S.A.

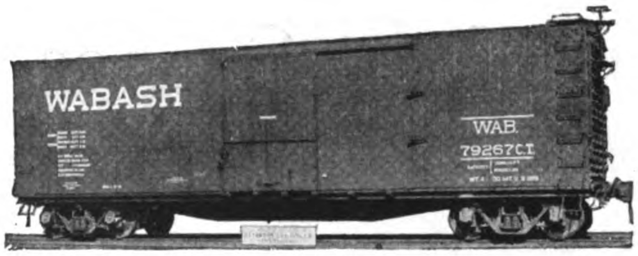
Cable Address: "BUCYRUS, SOUTH MILWAUKEE"

London Office: BUCYRUS COMPANY, 19, Iddesleigh House, Caxton Street, Westminster.

Agents in Siam: D. Couper-Johnston & Co., Bangkok, Siam.

Agents in India: McLeod & Co., Calcutta and Bombay, India.

Agents in Malay States: The Borneo Company, Ltd., Singapore, S.S.



Freight Cars, Mine Cars, Car Wheels, Car and R. R. Forgings.

Your inquiry is invited when you wish to fill a demand for new freight cars or other equipment. Our cars are giving long and economical service and safe carriage of merchandise on leading railroads all over the world.

We build cars only of the strongest materials, and design them to meet any given conditions. We can furnish cars of any type for any gauge.

Let us make quotations upon your replacements or new equipment.

Mount Vernon Car Mfg. Co.

Mount Vernon, Ill., U.S.A.

JAPANESE

TEXTILES

FOR EXPORT

Standard Printed and Dyed Cotton and Silk Fabrics

SHIRTINGS SHEETINGS DRILLS
PRINTS CRETONNES FLANNELETTES
DAMASKS TOWELING CREPES
ETC. ETC.

PONGEES BROCADES SATINS
CREPES SILKS

FUJI GASSED SPINNING COMPANY, LIMITED

(FUJI GASU BOSEKI KABUSHIKI KAISHA)

Head Office:
GOCHOME, OSHIMA-MACHI
NEAR TOKYO
CABLE ADDRESS: "FUHO"

CAPITAL - Yen 38,000,000
OPERATING
450,000 Spindles and
1,775 Looms

Business Office:
SHICHOME, HAKOZAKI-CHO,
NIHONBASHI-KU,
TOKYO

Silks, Crepes, Brocades, Cotton Cloths, Muslins

SILK AND COTTON YARNS, NOILS, etc.

OUR EXPORT DEPARTMENT
IS REPRESENTED IN ALL THE IMPORTANT COMMERCIAL CENTERS OF THE WORLD AND CAN FURNISH PROMPTLY FULL INFORMATION AND QUOTATIONS REGARDING THE LARGE VARIETY OF TEXTILES MADE IN OUR MILLS

KANEGAFUCHI SPINNING COMPANY, LIMITED

HIGASHI-SHIRIIKE, KOBE, JAPAN

AVERY

PROPELLER BALANCER

No. 540

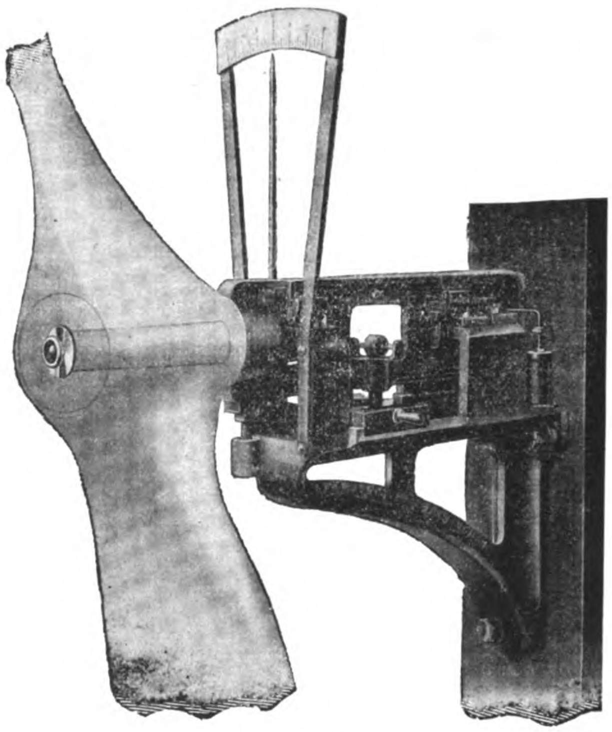
OWING TO THE HIGH SPEED OF ROTATION TO WHICH PROPELLERS ARE SUBJECTED, THE BLADES MUST BE ACCURATELY BALANCED. ANY SLIGHT EXCESS OF WEIGHT IN EITHER OF THE BLADES WILL PRODUCE AN UNBALANCED CENTRIFUGAL FORCE, CAUSING VIBRATIONS.

THE APPARATUS CONSISTS OF A BEAM FITTED WITH KNIFE-EDGES RESTING IN STEEL BEARINGS. AN ACCURATELY TURNED SPINDLE IS ARRANGED TO BE AXIALLY IN LINE WITH THE KNIFE-EDGES, AND A LOOSE GUN METAL SLEEVE TURNED TO SUIT THE PROPELLER IS FITTED OVER THIS.

THE PROPELLER TO BE TESTED IS THREADED ON TO THE SLEEVE AND SET TO DIFFERENT ANGLES, SO AS TO DETERMINE THE AMOUNT OF UNBALANCE. THIS IS SHOWN UPON THE GRADUATED QUADRANT, AND INDICATES THE AMOUNT OF MATERIAL TO BE REMOVED.

WRITE FOR LIST NO. L2 TO-DAY TO—

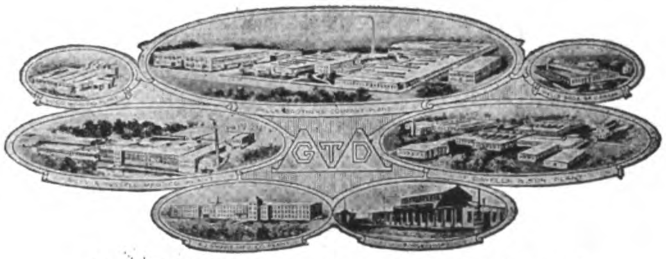
W. & T. AVERY LTD
SOHO FOUNDRY
BIRMINGHAM, ENGLAND.



No. 540
Avery Propeller Balancer

Ad. 607

You need these tools from GTD



Plants of GTD Corporation, World's Largest Manufacturers of Screw-threading Tools

1

2

3

1 The GTD Opening Die Stock is a hand tool which cuts an unusually accurate thread and requires slight effort to operate. After the thread is cut the die may be released, and pulled straight off the work. No time wasted in unwinding. Furnished to cut either Whitworth or USS threads.

2 *"Little Giant"* screw-plates contain assortments of tools for cutting screw-threads by hand:—taps, dies, die stocks and tap wrenches. Made by GTD in assortments suitable for every threading need. Look for the brand names, *"Little Giant," "O. K.," "Lightning"* and *Green River"* on screw-plates.

3 No. 490 GTD Adjustable Reamer can be adjusted to cut larger or smaller than normal. A very necessary tool for fitting tight pulleys, gears, etc. GTD makes an excellent line of reamers for all purposes including hand, expansion, taper, special Ford car reamers, repairman's taper reamer, etc.

WE invite you to send for booklets and catalogs descriptive of our tools. We will be pleased to place at your service our nearly fifty years of experience in making fine tools if you will fill out the coupon and mail it in. We will supply you with the latest information concerning the tools indicated, and place your name on our mailing list to receive additional information as issued.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASS., U.S.A.

Canadian Plant: Greenfield Tap & Die Corporation of Canada, Limited, Galt, Ontario.
Cable address: "Getede"

Horne Company, Ltd.
6-7 Takayama-Cho, Kyobashi-Ku
Tokyo, Japan

Fudo Bank Bldg., 9.2-chome
Honkokucho, Nihonbashiku
Tokyo, Japan

Muller, Phipps & Hodges, Ltd.
38 Kiangse Road
Shanghai, China

Muller, Phipps & Sellers, Ltd.
17 Itachibori Kitadori
5-chome, Nishi-Ku
Osaka, Japan

Muller & Phipps (Asia) Ltd.
P. O. Box 25, Prince's Bldg.,
Hongkong

Dodge & Seymour (China) Ltd.
89-91 Rue Montauban
Shanghai, China

GTD Corporation
Greenfield, Mass. U.S.A.

Please send me catalogs and booklets descriptive of the tools I have checked, and add our name to your permanent mailing list for further information as issued.

☐ Production Threading Tools
☐ Repair Threading Tools

Name Position
Firm
Address

F.E.R. 919

Jardine, Matheson & Co., Ltd.

CANTON	HANKOW	ICHANG	TIENTSIN
CHENGTU	HARBIN	PEKING	TSINGTAO
CHUNGKING	HONGKONG	SHANGHAI	ETC.

Engineering Show Room: 8A YUEN-MING-YUEN ROAD, SHANGHAI

Sole Agents for Associated British Machine Tool Makers, Limited.

Comprising the following Firms :—

JAMES ARCHDALE & CO., LTD, Birmingham.
WILLIAM ASQUITH, LTD., Halifax.
J. BUTLER & CO., Halifax.
THE CHURCHILL MACHINE CO., LTD., Manchester.
DEAN, SMITH & GRACE (1908), LTD., Keighley.
KENDALL & GENT, LTD., Manchester.
JOHN LANG & SONS, LTD., Johnstone, Glasgow.
J. PARKINSON & SON, Shipley.
GEO. RICHARDS & CO., LTD., Broadheath, Manchester.
THOMAS SHANKS & CO., Johnstone, Glasgow.
SMITH & COVENTRY, LTD., Manchester.
H. W. WARD & CO., LTD., Birmingham.

The full range of Machine Tools manufactured by this combination is as follows:

LATHES

Sliding Surfacing and Screwcutting Lathes, Plain Lathes, High Speed Lathes, Axle Lathes, Toolroom Lathes, Surfacing and Boring Lathes, Vertical Boring Lathes, Cutting-off Lathes, Heavy Forge Lathes, Gun Lathes, Shafting Lathes, Break Lathes, Wheel Lathes, Relieving Lathes, Capstan, Turret and Brassfinishers Lathes of all types. Chucks and Self-opening Dieheads.

DRILLING MACHINES

Radial Vertical Drills of all sizes. Girder, Portable and Multiple-spindle Radials, Pipe-flange Drilling and Facing Machines, Ball-bearing Sensitive Multiple Drills and High-speed Drilling Machines.

MILLING MACHINES

Plain, Vertical, Horizontal and Universal Milling Machines, Plano-Milling Machines, Keyway and Slot Drilling Machines, Thread Milling Machines.

PLANING AND SHAPING MACHINES

Planing Machines in all sizes. Armour-plate Planing Machines, Pillar and Traversing Head Type Shaping Machines, Spiral Bevel Gear Planers, Side Planing Machines, etc.

BORING MACHINES

Horizontal Boring Machines, Special Boring Mills for Turbine Casings, Tyre Boring Machines.

GRINDING MACHINES

Twist Drill Grinding Machines, Cylindrical Grinders, Crank Shaft Grinders, Cam Grinders, Universal Chucking Grinders, Internal Grinders, Piston Ring Grinders, Wet Tool Grinders, Cutter Grinders, etc.

SLOTTING MACHINES

All types including High Speed and Portable Slotting Machines.

MISCELLANEOUS

Cutting-off Machines, Bolt Screwing Machines, Gun-boring, Lapping and Rifling Machines, Centring and Facing Machines, Nut Facing Machines, Universal Sharpening Machines, Mandrel Presses, Sand Blasts, Air Compressors, Broaching Machines, Twist Drills and Vices of all kinds.

ENQUIRIES SOLICITED

TUBES

IRON, STEEL, BLACK, GALVANISED

BOILER TUBES

Gas Water and Steam Tubes and Fittings
Boring & Casing Tubes
Tubular Coils for Heating and other Purposes.

STC

Sole Licensees in Great Britain for the Manufacture of

"ARMCO" Rust and Corrosion Resisting Iron Tubes

Write for Descriptive Pamphlet

THE SCOTTISH TUBE CO., LTD.

Head Office: 34 Robertson Street, GLASGOW.

Branch Offices—London, Manchester, Leeds, Liverpool, Newcastle-on-Tyne, Cardiff, Sydney, N.S.W.; Wellington, N.Z., Johannesburg, Cape Town and Durban, S.A.

Works—Glasgow, Govan, Coatbridge, Rutherglen and Garnkirk.

Telegraphic Address: "Scotubeco" Glasgow. Codes: A1, A.B.C. (4th & 5th Editions), Lieber's, Bentley's, Western Union and Private.

The Pneumercator Tank-Gauge

(PATENTED)

Measures and Weighs

FUEL OIL

or Any Liquid,
in Any Tank,
at Any Distance

Unaffected by Changes of Temperature.

NO FIRE RISKS.

WRITE FOR DESCRIPTIVE BOOKLET.

Sole Manufacturers for GREAT BRITAIN and EUROPE, INDIA, CHINA, AUSTRALIA, NEW ZEALAND, SOUTH AFRICA, ARGENTINE REPUBLIC, CHILE

KELVIN BOTTOMLEY & BAIRD LTD

MANUFACTURERS OF THE LATE LORD KELVIN'S INVENTIONS AND OTHER INSTRUMENTS

18 CAMBRIDGE ST. GLASGOW

Consolidated Steel Corporation

25 Broadway, New York, U.S.A.

SHANGHAI OFFICE: GLEN LINE BUILDING, 1-A PEKING ROAD, SHANGHAI
TOKYO OFFICE: 21 NIGASHI DORI MARUNOUCHI
CALCUTTA OFFICE: 6 HASTINGS STREET
BRANCH OFFICES AND REPRESENTATIVES IN PRINCIPAL COUNTRIES THROUGHOUT THE WORLD

CABLE ADDRESS: CONSTECO, NEW YORK

Cable Codes: **Consolidated Steel Corporation, Western Union, A B C Fifth Edition Improved, Scott's 10th Edition, Bentley's Complete Phrase, Lieber's**

SOLE EXPORTER OF THE COMMERCIAL PRODUCTS OF

BETHLEHEM STEEL COMPANY
BRIER HILL STEEL COMPANY
CAMBRIA STEEL COMPANY
LACKAWANNA STEEL COMPANY
LUKENS STEEL COMPANY
MIDVALE STEEL & ORDNANCE COMPANY
REPUBLIC IRON & STEEL COMPANY
SHARON STEEL HOOP COMPANY
TRUMBULL STEEL COMPANY
WHITAKER-GLESSNER COMPANY
YOUNGSTOWN SHEET & TUBE CO.

CONSTECO

TRADE MARK

We invite and will give prompt attention to inquiries for all forms of iron and steel products, including the following:—

PIG IRON	Basic, Bessemer, Foundry, and Malleable.
SEMI-FINISHED STEEL	Ingots, Billets, Blooms, Slabs, Skelp and Sheet Bars.
RAILWAY MATERIAL	Rails with Complete Accessories; Standard, Girder, Guard and High T-Rails; Steam and Electric Railway Frog and Switch Material; Special Track Work, including Switch Stands. Tires, Steel Tired Wheels, Rolled Steel Wheels; Locomotive and Car Axles, Loose and Mounted; All Steel Passenger Cars; Open Freight and Tank Cars; Forged Steel Locomotive and Car Parts; High Speed and Carbon Tool Steels.
STRUCTURAL STEEL	For Bridges, Buildings, Cars, Locomotives, Ships, etc. Plates, Sheared and Universal Mill, for Tank, Boiler, Ship, Firebox, Steel Bottom, etc. Angles, both Standard and Bethlehem, Special Sections, Channels, Shapes and Beams. Piling—Consteco-Lackawanna Sheet Piling (manufactured by Lackawanna Steel Company). Bars—Merchant Steel, Reinforcing, Refined Iron, Double Refined Iron, Staybolt Iron, Tool Steel, etc. Fabricated Structural Steel for Bridges, Buildings, Towers and other Structures.
TUBULAR PRODUCTS	Boiler Tubes, Lapwelded, Open-Hearth Steel and Genuine Knobbled Charcoal Iron; English Standard Steel Tubes, Gas and Steam Weights; Black and Galvanized and Red Painted American Standard Full Weight Pipe, American Standard Extra Heavy Pipe, Black and Galvanized. Line Pipe, Drive Pipe, Drill Pipe, and Oilwell Tubing. Standard Lapwelded and Special California Casing, Rigid and Flexible Electric Conduit.
SHEET AND TIN MILL PRODUCTS	Galvanized, Flat and Corrugated Steel Sheets, Blue Annealed Sheets, Shovel Sheets, One Pass Cold Rolled Close Annealed Black Sheets, Enamelling Stock, Deep Drawing and Extra Deep Drawing Stock and Copper Bearing Sheets. Coke Tin Plate, Best Cokes, Full Finished Tin Mill Black, Taggers and Dairy Stock, Terne Plate.
WIRE PRODUCTS	Wire Rods of Bessemer and Basic Open Hearth Steel, both Low and High Carbon. Bright, Soft, Bright Hard Drawn, Black Annealed, Galvanized, and Coppered Round Steel Wire. Galvanized Barbed Wire, Galvanized Staples, Wire Nails, etc.
FLAT STEEL PRODUCTS	Hoops, Bands, Hot Rolled Strip, Cold Rolled Strip.
SPECIAL PRODUCTS	Forgings, Castings, Toolsteel, Alloy Steels, Special Steels, Circular Sections, etc.
BOLTS AND NUTS	Rivets, Track Bolts, Spikes, Turnbuckles and Washers.
MACHINERY	Machine Tools, Planers, Horizontal Boring Machines, Hydraulic Presses Complete, Pumps and Pumping Engines, Railway Shop Machinery, Shipyard Machinery, Rolling Mill Machinery and Equipment, and any other Special Machinery Designed to order.

CANADIAN
CARBIDE
GIVES
MORE GAS
PER
POUND

AND
GAS IS
WHAT YOU
ARE
BUYING

Export Drum with Wood over Cask

Years of manufacturing experience, plus facilities for quantity production assure highest gas yield and moderate prices.

CANADA CARBIDE CO., LTD.

Power Building, MONTREAL, CANADA.

Manufacturers and Exporters of

"S" BRAND HIGH-GRADE CARBIDE OF CALCIUM

Cable Address: CARBIDE, Montreal, Canada

Western Union, Bentley's and A.B.C. 5th Edition Codes.

Through America

via

The Milwaukee Railway

(The Puget Sound Electric Route)

A short, quick, and most comfortable route across the American Continent over the

World's Longest Electrified Railroad

For 649 miles over four mountain ranges mighty electric locomotives, using "White Coal" for power haul the splendidly equipped all-steel transcontinental trains

"The Olympian" and "The Columbian"

from Seattle and Tacoma daily for Spokane, Butte, Minneapolis, St. Paul, Milwaukee and Chicago.

"The Pacific Limited"

from San Francisco to Chicago via Southern Pacific, Union Pacific and Milwaukee Railways.

At Chicago connections are made with fast express trains for the Atlantic Seaboard and all points east.

Rail orders and full information respecting train schedules, connections, fares, etc., on application to your steamship agent or at any office of Thos. Cook & Son in the Orient.

For sleeping car reservations, write, cable or wireless any of the following representatives of the

Chicago, Milwaukee & St. Paul Railway

Cable Address: "Milwaukee"

Seattle—J. F. Bahl, City Passenger Agent, 2nd and Madison
San Francisco—C. H. Miles, General Agent Passenger Dept., 995 Monadnock Bldg.
Vancouver—Geo. W. Hibbard, General Agent, 626 Hastings St., West
Victoria—F. O. Finn, General Agent, 902 Government St.
A. P. Chapman, Jr., Ass't Gen'l Passenger Agt., 663 Stuart Bldg., Seattle
Geo. B. Haynes, General Passenger Agent, Chicago

IRON AND STEEL TUBES

for Gas, Water, Air, Steam, Oil, Sewage, Irrigation & other purposes

Black and Galvanized Tubes and Fittings.
Boiler Tubes · Weldless Steel Tubes · Boring Tubes.
: *Main Steam Pipe Installations.* :
Tubular Steel Tramway & Electric Light Poles.
Ashford's Patent Tube Well Strainers.
Steel Plates. ______________ *Steel Castings.*

STEWARTS AND LLOYDS, LTD.

GLASGOW BIRMINGHAM LONDON

SHANGHAI OFFICE: 6 KIUKIANG ROAD

SALE & FRAZAR

S F   S F

LIMITED

No. 1 YAYESUCHO, KOJIMACHI-KU

TOKYO

CENTRAL POST OFFICE BOX No. 18

IMPORTS   EXPORTS

Telegraphic Address: "FRAZAR" For All Offices

Since 1834 The Name "FRAZAR" has been Connected

WITH

ORIENTAL TRADE

BRANCHES - - - - Yokohama, Kobe, Osaka, Kyoto, Moji, Hakodate, Nagoya, Keijo (Korea), Taihoku (Formosa), Mukden (Manchuria), Vladivostok (Siberia.)

AFFILIATED COMPANIES -
- FRAZAR & CO., 30 Church St., New York, and Paris, Seattle, San Francisco.
- FRAZAR TRUST CO., LTD., Tokyo and Yokohama.
- FRAZAR FOREIGN TRADE BUILDING CO., New York.

CORRESPONDENTS - - -
- SALE & CO., 21 Old Broad St., London, E.C.
- F. G. SALE & SONS, 20 Bishops Gate, London, E.C.
- E. W. FRAZAR & CO., 5 Rue de Paris, Tientsin and Peking, Harbin, Mukden.

WORLD-WIDE CONNECTIONS
EXCLUSIVE AGENCIES IN ALL LINES
LARGE STOCKS

A FEW OF OUR AGENCIES

MANY OTHER EXCLUSIVE AGENCIES

MOTORCARS, TRUCKS, TRACTORS, ETC. Ford Motor Co., Hupmobile Motor Car Corp., Franklin Motor Car Co., Armstrong Siddeley Co., Ltd., Rolls Royce Co., Ltd., The White Co. (Trucks), Splitdorf Electrical Co.
MACHINE TOOLS. Joseph T. Ryerson & Son, Giddings & Lewis Mfg. Co., Wm. Sellers & Co., Inc.
RAILWAY EQUIPMENT. Baldwin Locomotive Works, W. H. Miner, Griffin Wheel Co., Duff Mfg. Co.
AVIATION EQUIPMENT: Handley Page, Ltd.
BRITISH STEEL and STEEL PRODUCTS. Jonas and Colver, Ltd., Smith & Coventry, Ltd., Sheffield Twist Drill & Steel Co., Ltd., Chubb & Son's Lock & Safe Co., Ltd.
CANNING MACHINERY and EQUIPMENT. American Can Co., Adriance Machine Works, Anchor Cap & Closure Co., Burpee and Letson Ltd., Seeley Brothers.
CANNED SALMON and CRAB from Kamchatka.
Fairbanks Morse & Co. Stationary and Marine Engines. Motors, Pumps, Wind Mills, complete Power and Lighting Plants.
Chain Belt Co., "Rex" Concrete Mixers.
J. L. Mott Iron Works, Plumbing Fittings and Supplies.
Shepard Electric Crane & Hoist Co., Cranes and Hoists.
Armour & Co., Canned Meats and Fruits, Soaps, Toilet Articles.
The Carnation Milk Products Co., "Carnation Cream."
The Glidden Co., Paints, "Jap-a-lac" Auto Finishes, Cold Water Paints, Wood Stains.
The Duratex Co., "Duratex" Leather Substitute and Rubber Coated Top and Curtain Materials.
S. C. Johnson & Son, Floor Wax, Paste, Liquid, and Powder.
The Klein Manufacturing Co., Technical Paints "Metal Crete" Concrete Hardeners, Cement Coating.
The Tungsten Wire Works (Stockholm), Wires for Filaments.
The Victor Talking Machine Co., Machines and Records.
The Graphoscope Development Co., Projectors and Films.
The Victor Typewriter Co., Standard Typewriters.
The Corona Typewriter Co., Folding Typewriters.
The Rolex Watch Co., Ltd., "Rolex" Watches.
Simmons Hardware Co., "Keen Kutter" and "Oak Leaf" Brands of Tools and Cutlery.
The Gillette Safety Razor Co., "Gillete" Blades.

ROAD, EXCAVATING, POWER HOUSE, REFRIGERATING MACHINERY: STEEL and IRON PRODUCTS: "Gould" STORAGE BATTERIES.

RADIO APPARATUS, HEATING EQUIPMENT, FERTILIZERS, SAWN TIMBER CHEMICALS.

OUR SERVICE also covers BONDS and INVESTMENTS, FIRE and MARINE INSURANCE, SHIPPING, STORING, CHARTER, SALE and PURCHASE of STEAMERS.

INQUIRIES SOLICITED - If we cannot Supply your Requirements from Stock, we will be pleased to Recommend Local Alternatives or Advise Regarding Imports.

FIREPROOF
Ambler
Asbestos Corrugated Roofing

Made of selected asbestos fibres and the best hydraulic cement, compressed into compact sheets under three thousand pounds pressure per square inch, Ambler Corrugated Roofing and siding cannot burn, rust, rot, split nor leak. Made in sheets twenty-seven and one-half inches wide with eleven complete corrugations, and in lengths of four, five, six, seven, eight, nine and ten feet to be applied directly on purlins with lead washers and either bolts or aluminium tie wires, furnished. This material is unaffected by heat or cold or climatic conditions. Send for our data sheets showing method of use. Address all inquiries to Export Department "B."

"Permanent as the Everlasting Hills"

NO PAINTING—NO REPAIRING

Manufactured by

Asbestos
Shingle, Slate & Sheathing
Company

Ambler, Penna., U.S.A.

Distributors Wanted throughout the East

Cable Address:
"IWASAKISAI.-TOKYO"

Code Used:
A. 1., A.B.C. 5th, Western Union, Bentley's Complete Phrase

MITSUBISHI SHOJI KAISHA, LTD.

(MITSUBISHI TRADING CO., LTD.)

Capital, fully paid-up - - - Y. 15,000,000

Head Office:

MARUNOUCHI, TOKYO.

Importers and Exporters, Manufacturers, Commission Merchants, Brokers, Ship Owners.

EXPORTING:

Coal, Copper and all Other Descriptions of Metals, Minerals and Cereals, Chemicals, Oil, Paper, Glass, Canned Fish, Silk Goods, and General Oriental Products and Merchandise

IMPORTING:

Iron, Steel, Machinery, Machine Tools, Chemicals, and General Merchandise

ANNUAL PRODUCTION:

Electrolytic Copper Ingots	20,000	Tons
Pig Iron	100,000	,,
Steel	50,000	,,
Coal	3,500,000	,,

COLLIERIES:

Takashima, Ochi, Yoshinotani, Kishidake, Namazuta, Shinnew, Hojo, Kanada, Kamiyamada, Ashibetsu, Biba', O-Yubari, and Sakito

BRANCHES and AGENCIES:

Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

STEAMSHIP DEPARTMENT—KOBE

Fleet Owned	25,000	Tons	Gross
Chartered Steamers	12,000	,,	,,

Regular and Irregular Routes between home ports and Chinese and South Sea Islands Ports, etc.

MIIKE COAL

The Finest Steaming and Bunker Coals of the Far East are mined from the famed Miike, Tagawa, Yamano Sunakawa and Kawakami Collieries operated by the

MITSUI

MINING COMPANY, LTD.

HEAD OFFICE:
No. 1 Surugacho, Nihonbashi-Ku,
TOKYO, JAPAN

Capital - - Yen 100,000,000

Annual Coal Output is equal to one-quarter of Total Japanese Mines.

LEAD, SILVER, GOLD, ZINC, COPPER, SPELTER, SULPHUR, COKE, IRON, CHEMICALS and DYES

Are produced from the Company's, KAMIOKA, Lead, Silver and Zinc Mine; SANO, Copper and Zinc Mine; KUSHIKINO, Gold Mine; KONGO, Tungsten Mine; IWAONOBORI, Sulphur and Metal Mine; Zinc Plants, Coke, Dyestuffs and By-products Establishments in Miike.

Sole Agents for our Products:

MITSUI BUSSAN KAISHA, Ltd.

(MITSUI & Co., Ltd.)

Tokyo, London, New York, Shanghai, Hongkong, and other Principal Commercial Centres of the World.

THE SUPERHEATER COMPANY

Designing Engineers and Manufacturers of

STEAM SUPERHEATERS

FOR

Locomotive, Marine and Stationary Service

Locomotive Feed Water Heater Equipment

Boiler Feed Pumps

Pipe Coils for Every Purpose

ELESCO

THE SUPERHEATER CO.

17 East 42nd Street New York, U.S.A.

PITTSBURGH STEEL CO.

Pittsburgh, Pennsylvania, U.S.A.

Manufacturers of "PITTSBURGH PERFECT"

OPEN HEARTH STEEL PRODUCTS

INCLUDING

Galvanized Wire
Bright Hard Wire
Bright Nail Wire
Annealed Wire
Bright Soft Wire
Bolt and Rivet Wire
Galvanized Barbed Wire
Wire Nails
Fence Staples

Pig-Iron, Blooms, Billets, Wire Rods, Hard Spring Coil Wire, Twisted Cable Wire, Bale Ties, Steel Hoops, Steel Bands, Cotton Ties and Fabricated Stock, Poultry and Lawn Fencing.

We are prepared to give PROMPT SERVICE, and solicit your inquiries accompanied by complete specifications.

ADDRESS:

PITTSBURGH STEEL CO.

EXPORT DEPARTMENT:

EQUITABLE BUILDING, NEW YORK, U. S. A.

Cable Address: "PITTSTEEL."

Transatlantische Handelskompagnie m.b.H.

HAMBURG

Cable address: Handelslot.—Codes: A.B.C. 5th, 6th Bentley, Carlowitz

Speciality Export of:
- Steel Bars, Plates, Girders, Wire, Wire-nails, Hardware, Cutlery.
- All kinds of Paper.
- Drugs & Chemicals & Sundries.

Seeks connections with 1st class buyers or importers.

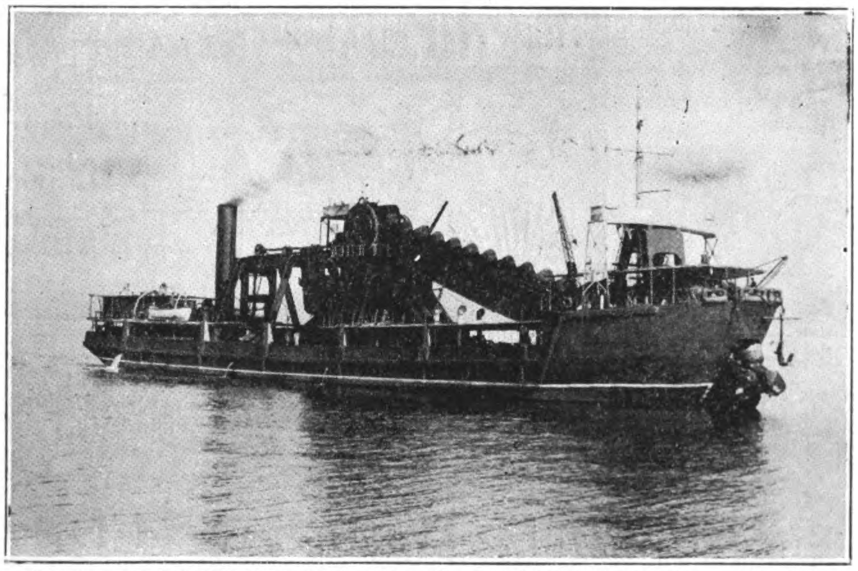
Wm. Simons & Co., Ltd., Renfrew

CONSTRUCTORS OF

Marine Dredging Plant

of most Modern and Improved Types and of the Greatest Capacities.

Constructors of Barge Loading, "Simons" Reclamation, Canal and Suction Cutter Hopper Dredgers. Hopper and Barge Loading Bucket Dredgers. Alluvial Dredgers. Trailing Suction Dredgers.



Twin Screw Bucket Ladder Hopper Dredger *Silurus*, Constructed to the Order of the Bombay Port Trust

Propelling and Dumb Hopper Barges.

Replace Parts supplied or fitted to existing Dredgers.

Inventors and First Constructors of "Hopper" and "Sternwell" Dredgers and Elevating Deck Ferry Steamers.

Head Office and Works: Renfrew, near Glasgow.

Telegrams: "Simons" Renfrew.

Established 1810

The Green Island Cement Co., Ltd.

SHEWAN, TOMES & CO.,

GENERAL MANAGERS, HONGKONG

Are You Going to Build?

Insist on your Architect specifying the use of the best brand of Portland cement in construction. If the house or factory is to be blocks or tiles, they should be of concrete, if stucco, only the best cement should be employed; if reinforced concrete is used, only a standard cement will stand the test; if your building is to be fireproof, waterproof, safe against earthquake or typhoon, improving with age, and lowering the cost of insurance, you must employ concrete, and the best concrete construction is only secured through the use of

Green Island Cement

Green Island Cement is supplied in Bags = 250-lbs. net, Casks = 375-lbs. net, Iron Drums = 375-lbs. net.

Also, Glazed Stoneware, House Drains, Sewer Pipes, and Fittings, Paving Bricks, Tiles, Fire Bricks and Fire Clay.

The Green Island Brand has become the standard Portland Cement of Asia, owing to its purity, uniformity and tests.

Used by H.B.M.'s Government in Hongkong, United States Government in the Philippines for all important Public Works.

Also by H.B.M.'s Government in Singapore and Federated Malay States for Government Buildings, Railways and Harbour Works.

Established 1883 **Telegraphic Address "ROPEWORK," HONGKONG**

THE HONGKONG ROPE MANUFACTURING Co., Ltd.

Manufacturers of Pure Manila Hemp Rope

Rope supplied to the British Navy on the China Station and to all Mail and regular Steamship Lines.

Ropes, Cables and Hawsers ½-in. to 15-in. Circumference. Driving Ropes for Mills; Bull Ropes and Drilling Cables for Oil Wells a Specialty.

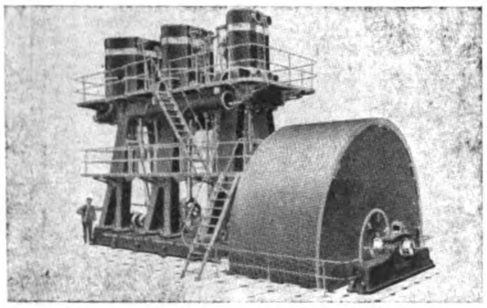
SHEWAN, TOMES & CO.

General Managers

St. George's Building HONGKONG.

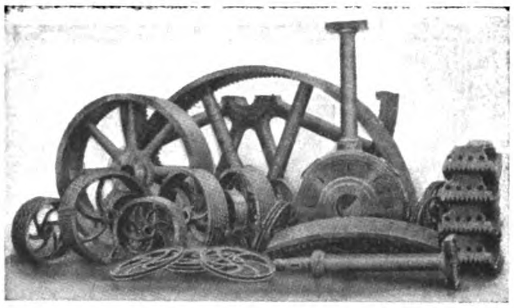
ASHTON FROST & CO., LTD.

ESTABLISHED 1873.



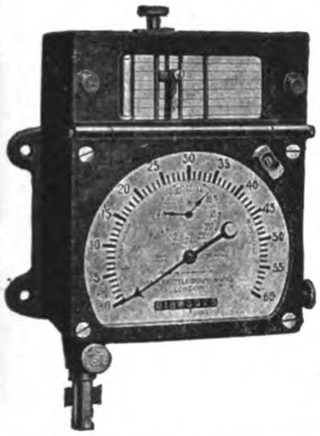
MAKERS OF

STEAM ENGINES,
MILL GEARING,
DEEP WELL PUMPS,
SEWAGE PLANT,
ETC.



TELEGRAMS: "FOUNDRY."

WORKS: **BLACKBURN, ENG.**



THE BEST LOCOMOTIVE SPEED INDICATORS & RECORDERS

WITH CONJUGATE MOVEMENT

TELOC TYPE

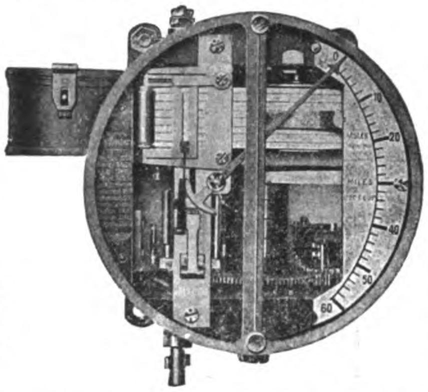
Chart Feed on a Mileage Basis of 10 m/m per Mile.

INDICATES:—Speed.
Total mileage since application of Instrument.
Total mileage of each run.
Time of Day in Hours and Minutes.
RECORDS:—Speed attained at any point of run.
Time the engine or coach is at work.
Distance covered.
Duration (up to 24 hours) and point of stops.
Time of Day in Hours and Minutes.
If desired apparatus to record working of Westinghouse or Vacuum Brakes.

HASLER TYPE

Chart Feed on a Time Basis of 4 m/m per Minute.

INDICATES:—Speed.
RECORDS:—Speed attained at any point of the run.
Time the engine or coach is at work.
Distance covered.
Duration and point of stops.
If desired bell can be fitted to ring at predetermined speed, or apparatus to record working of Westinghouse or Vacuum Brakes.



HASLER TELEGRAPH WORKS, 26 VICTORIA STREET, LONDON, S.W. 1.

Agents in China: WILLIAM FORBES & CO., PEKING.

The JANNEY-PENN Coupler

THE latest development of the Janney type of M. C. B. Coupling originally introduced and promoted by this company. This coupler has all the simplicity of the early type of the Janney coupler, and also has the up-to-date features of a "Lock-to-the-Lock," "Lock-Set," and a "Knuckle-Opener," and complies fully with all the requirements and recommendations of the M. C. B. Association of the U. S. A.

This coupler has the desirable feature of easy accessibility of parts, thus facilitating the making of repairs.

Furnished with various designs of rear end to suit different types of Draft Rigging.

Manufactured exclusively by

THE McCONWAY & TORLEY CO.

Pittsburgh, Pa., U. S. A.

Cable Address—Torley, Pittsburgh

China Agents: **The Fearon, Daniel Co., Tientsin, Peking, Hankow and Shanghai, China**

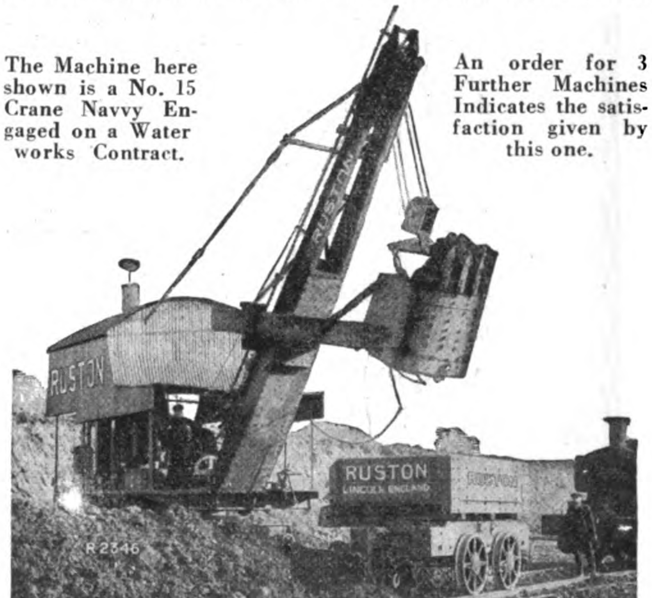
ECONOMICAL EXCAVATIONS

RUSTON EXCAVATORS—Crane Navvies Shovels, and Draglines have proved their efficiency on all classes of excavations in all parts of the world.

Wide Range of Machines available on Rail Wheels, Road Wheels or Caterpillar Tracks.

The Machine here shown is a No. 15 Crane Navvy Engaged on a Water works Contract.

An order for 3 Further Machines Indicates the satisfaction given by this one.

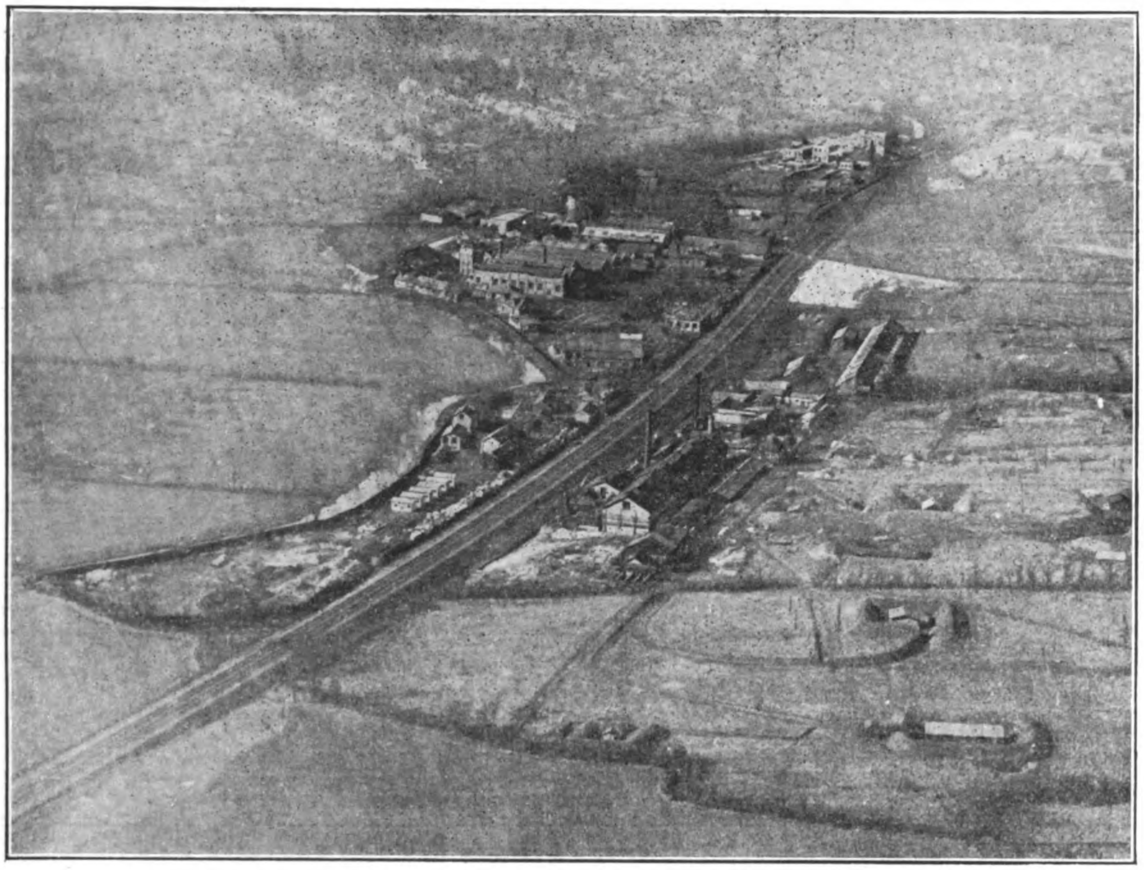


Full particulars from:—

RUSTON & HORNSBY LTD., LINCOLN, England.

OR

MARTIN & CO., CALCUTTA.
ARNHOLD BROTHERS & CO., LTD., SHANGHAI.
UNITED ENGINEERS LTD., SINGAPORE.



FAMOUS FACTORIES — STOWMARKET

The above photograph, taken from the Air, shows the greater portion of the factory of "Necol" Industrial Collodions Limited, a constituent company of Nobel Industries Limited. Situated at Stowmarket, the original factory erected in 1861 for the manufacture of Nitrocellulose, has been enlarged until it now covers an area of over 200 acres. During the War, the Company supplied large quantities of Munitions and Nitrocellulose Syrup for Aeroplane Dopes, and since the change over from War to Peace conditions is now devoting its whole attention to Collodion Products under the trade name "NECOL."

Nitrocellulose for—
- Leather Cloth Manufacture.
- Manufacture of Gas Mantle Dip.
- Photographic Films.
- Coloured Celluloid Manufacture.
- Solutions for coating of Split Leather.
- Waterproofing Leather.
- Coating Gas Mantles.

Lacquers for the Metal Trades.
Bronze Mediums for Picture Frame Trade.
Black Enamels for ordinary Metal Work.

Coloured Enamels for colouring Celluloid, Metal or Woodwork.
Coloured Lacquers for Electric Lamps.
Wood Finishes for Woodworking Trades.
Textile Stains for Decorating Fabrics.
Collodion for Proofing Textiles.
"Necol" Cement for stiffening Box Toes for Boots and Shoes.
"Necol" Cement for Belting Joints.
"Necol" Boot Repairing Cement.
"Necol" Household Cement.
"Necol" Plastic Wood for use by Engineers' Pattern Makers, etc.

A speciality is made of Concentrated Nitrocellulose Solutions or Dopes for all purposes in a form specially suitable for shipment to all parts of the world.

Particulars of the above and other Nobel Products can be obtained from :—

NOBEL INDUSTRIES LIMITED

Head Office :

NOBEL HOUSE, LONDON, S.W.1

Write to the Advertising Department, Nobel House, for illustrated booklet, "The Products of Nobel Industries, Ltd." mentioning this Journal.

UNITED STATES STEEL PRODUCTS COMPANY

30 Church St., New York, U.S.A.

Sole Exporters of the Products of

Carnegie Steel Company
Illinois Steel Company
American Steel & Wire Company
American Sheet & Tin Plate Company
The Lorain Steel Company
American Bridge Company
National Tube Company
Tennessee Coal, Iron & Railroad Company
Minnesota Steel Company
Canadian Steel Corporation
Chickasaw Shipbuilding and Car Company

BRANCH OFFICES and REPRESENTATIVES IN

Antwerp, Belgium
Birmingham, England
Bombay, India
Brussels, Belgium
Buenos Aires, Argentine Republic
Calcutta, India
Cape Town, South Africa
Christiania, Norway
Concepcion, Chile
Glasgow, Scotland
Havana, Cuba
Johannesburg, South Africa
Lima, Peru
Los Angeles, California
London, England
Mexico City, Mexico
Montreal, Canada
New Glasgow, Canada
New Orleans, La
Paris, France
Peking, China
Portland, Oregon
Rio de Janeiro, Brazil
Rome, Italy
Rotterdam, Holland
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Seattle, Washington
Soerabaya, Java
Sydney, New South Wales
Tokio, Japan
Toronto, Canada
Valparaiso, Chile
Vancouver, Canada
Winnipeg, Canada

WAREHOUSES AT

Antwerp, Belgium
Bombay, India
Buenos Aires, Argentine Republic
Calcutta, India
Callao, Peru
Cape Town, South Africa
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Talcahuano, Chile
Valparaiso, Chile

We give prompt attention to inquiries for all class of our Steel Products, including the following:—

Aerial Tramways—Reversible, specially designed
Alloy Steel
Alloy Steel Sheets
Ammonia Cylinders
Angles
Armatur Sheets
Axles—Locomotive, Railroad and Tramway Cars
Bamboo Steel
Barbed Wire
Bars—Steel, Concrete Reinforcement
Billets
Blacks Sheets
Blooms
Boiler Tubes, Lapwelded, Seamless
Bolts and Nuts
Bridges—Railway, Highway, specially designed
Buildings—Steel Warehouses, Structural Steel for Buildings
Cables—Steel Hoisting and Hauling Cables
Cars—Steam Railway, Mine and Industrial Railway Cars
Car Angles
Car Wheels
Circular Steel Poles
Cold Rolled Flat Wire
Copper Rail Bonds
Copper Steel Sheets
Derricks
Drilling Machines
Drilling Rigs for Oil Wells
Duquesne Rail Joints
Electrical Sheets
Electrical Wires and Cables
Fabricated Structural Material for Bridges, Turntables, Steel Buildings, etc.
Fencing Materials—Wire Fencing, Steel Posts
Forgings
Frogs and Switches—Steam and Electric Railways
Hoops and Bands
Machine Forgings
Mine Timbers
Nails and Spikes
Nail Wire
Pig Iron
Piling—Steel Sheet
Pipe—Black and Galvanized Wrought, for Steam, Gas and Water: American or English Lapwelded Boiler Tubes. Matheson Lead Joint Pipe. Seamless Steel Tubing
Plates—Boiler, Tank, Ship, Flange and Fire Box Steel
Poles—Steel Tubular
Rails—Light and Heavy Rails for Railways, Tramways, Mine and Industrial Railways. Special Track Work
Reinforcement for Concrete—Triangle Wire Mesh
Rivets
Rope—Wire for Mine Hoists, Derricks, Cranes, etc.
Screw Spikes
Screw Stock—Cold Drawn
Shafting
Shapes—Standard Structural
Sheet Bars
Sheets—"Apollo" Brand, Plain, Galvanized, Corrugated, Black
Skelp
Slabs
Spikes—Railway Track Spikes
Sleepers—Steel
Spring Steel
Steam Pipe and Tubes
Stove Pipe Skeebs
Switchs—Switch Stands
Tank Plates
Terne Plates
Tin Mill Products
Tin Plate—"Coke," "Charcoal" and "Terne"
Tool Steel
Towers—Steel
Triangle Mesh Concrete Reinforcement
Tubes—Gas, Water, Steam
Turntables for Light and Heavy Railway Service
Upholstery Springs
Washers
Weatherproof Insulated Telephone and Signal Wire
Wheels—Solid Wrought Steel for Steam, Electric, Mine and Industrial Railways
Wire Products—Plain, Galvanized, Bright Hard, Bright Soft, Baling and Fencing. All Classes of Coated and Uncoated for Manufacturing Purposes

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE: Union Building—The Bund and Canton Road

PEKING OFFICE: No. 22 Wu Liang Ta Jen Hutung

TOKYO OFFICE: No. 15 Nakadori, Marunouchi

OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President:
Baron K. Okura

BRANCHES at Hakodate, Yokosuka, Yokohama, Osaka, Kobe, Maizuru, Kure, Moji, Saseho, Keelung, Taihoku, Seoul, Antung, Penhsihu, Mukden, Tientsin, Peking, Hankow, Changsha, Kiukiang, Tsingtau, Hongkong, Vladivostok, Sydney, San Francisco, New York, London.

Head Office:
Ginza, Tokio

GENERAL IMPORTERS AND EXPORTERS

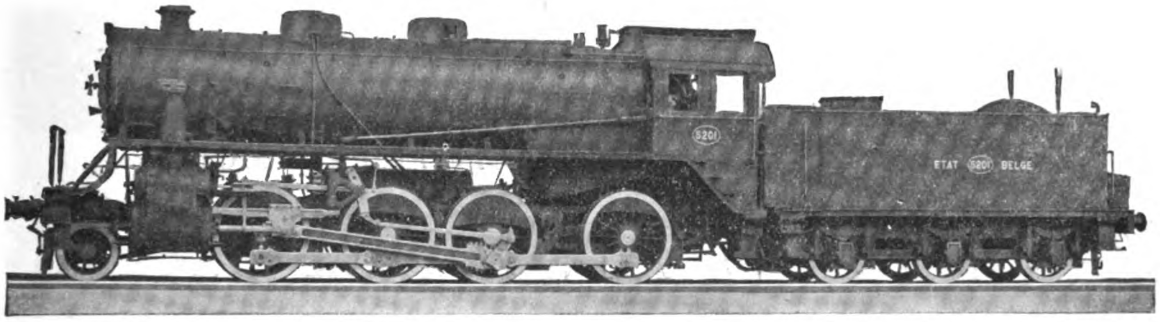
Rails, Bridges, Locomotives and other Railway Supplies
Electric Plants, Electrical Supplies
Sugar Plants, Spinning Machinery, Machine Tools
Factory Equipments, and all kinds of Machines
Automobiles, Guns and Explosives
Structural Materials, Steel Materials, Metals
Mineral Products, Chinese and Japanese Produce, Silk
Cotton, Wool, and their Manufactures
Fertilizers, Chemicals, Vegetable Oils and Wax, Dye Stuffs
Food Stuffs, Hides and Fur, Skins, Pen-hsi-fu Smokeless Coal and Pig Iron, etc.

BUILDING AND CIVIL ENGINEERING CONTRACTORS,
INSURANCE AGENTS

Yih Chong Wharf (Okura)

POOTUNG, SHANGHAI

AN UNUSUAL TRIBUTE



BUILT FOR THE BELGIAN GOVERNMENT

Total Weight of Engine, 188,000 pounds; Weight on Driving Wheels, 167,000 pounds; Diameter of Driving Wheels, 59¾ inches; Boiler Pressure, 200 pounds; Cylinders, 24 × 28 inches; Maximum Tractive Power, 35,000 pounds.

An unusual tribute to the locomotives supplied to the Belgian Government by the United States builders recently appeared in the Belgian official publication—"Chronique des Travaux Publics."

The following are extracts from this article:—

"The American locomotives measure up to the most optimistic expectations, inasmuch as we are using them on the Luxembourg line, the hardest division of our railways—and all are giving the best of service.

"The good quality of the American engine is proved by the significant fact that they are used in passenger service.

"The most important part of the locomotive—the boiler—is perfect.

"In a word, the American locomotives are giving entire satisfaction. They conform to the technical requirements imposed and they have to-day already given considerable service."

AMERICAN LOCOMOTIVE SALES CORPORATION

Export Sales Agents for

AMERICAN LOCOMOTIVE COMPANY

AND

MONTREAL LOCOMOTIVE WORKS, LIMITED

30 CHURCH STREET, NEW YORK, U. S. A.

CABLE ADDRESS: "LOCOMOTIVE," NEW YORK

RESIDENT TECHNICAL REPRESENTATIVE

CHINA: PEKING—F. M. Titus, 24 Shih Chia Hutung

MITSUI BUSSAN KAISHA

Cable Address: "MITSUI"

LIMITED

Capital: Yen 100,000,000
Reserve: „ 30,000,000

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

IMPORTERS AND EXPORTERS

SHIPOWNERS AND SHIPBUILDERS

Head Office: TOKYO, JAPAN

Branches:

HOME—Yokohama, Nagoya, Osaka, Kobe, Otaru, Muroran, Hakodate, Niigata, Moji, Wakamatsu, Kuchinotsu, Nagasaki, Karatsu, Miike, Taipeh, Keelung, Tainan, Takow, etc., etc.

ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soerabaya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc., etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc., etc.

IMPORT.

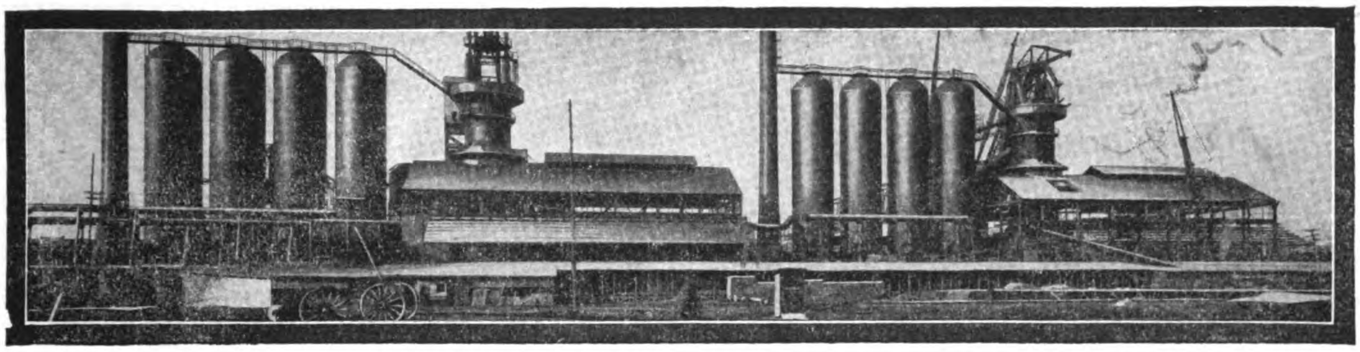
Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

ENGINEERING DEPARTMENT

Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Export Co.
Manning Maxwell & Moore, Inc.
Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc. etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



McClintic-Marshall Blast furnace plant,
Ford Motor Company, Detroit, U.S.A.

The surest way to safeguard against waste in steel construction is to lay your plans before builders of mature judgment. Profit from their experience with problems similar to yours.

The McClintic-Marshall Products Company conceives and builds steel structures of every description, including industrial buildings, bridges, power plants, ships, train sheds, warehouses, etc., and its long training insures the most scientific and economical accomplishment.

We Design.
Manufacture and Erect
Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity, 400,000 Tons

Write for Booklet 401

McClintic-Marshall Products Company

FACTORIES: PITTSBURGH, U. S. A.
Foreign Contract Dept: 50 Church Street, NEW YORK, U. S. A.
Cable Address: "Macmarsh," NEW YORK.

YOKOHAMA: H. E. Root, 50a Yamashita-cho

LONDON: George A. Smith, St. Stephen's House, Westminister, London, S.W. 1.
PARIS: Produits Métallurgiques McClintic-Marshall, 8 Rue Edouard VII
MADRID: Hispano-American Corporation.
HAVANA: San Ignacio y Obrapia
Codes: Bentley's, General, Western Union Five Letter, Lieber Five Letter

McClintic-Marshall

Steel Construction

MACHINERY for Manufacturing Tin Cans—Tin Ware—Metal Packages Cutlery—Hardware—Aluminum Ware and Enamel Ware—Electrical Equipment. Also Horseshoe—Minting and Drop Forging Machinery

1857 BLISS 1922

Bliss One Blow Lock Seamer. Built in a large number of sizes. Used for forming and closing at one blow the side seams on round tin cans. This is one of the machines used in the production of round tin cans where small production is desired.

For the manufacture of tin containers as shown in the illustration above we build complete lines of machines. We build full automatic lines for large production and semi-automatic machines for small production.

Our standard line of automatic High Speed Machines for making round sanitary cans for fruits and vegetables will give a production of over 90,000 cans a day.

Send us samples or drawings of the cans you wish to produce, stating daily production desired of each can; we will tell you the machines which best meet your needs.

"Bliss" on your machinery is more than a name; it's a guarantee.

E. W. BLISS CO. MAIN OFFICE AND WORKS **BROOKLYN, N. Y., U. S. A.**

American Factories: **BROOKLYN, N.Y. HASTINGS, MICH. CLEVELAND, OHIO. SALEM, OHIO.**

FOREIGN SALES OFFICES AND FACTORIES:

ENGLAND, Pocock St., Blackfriars Rd., S. E., London **ITALY, 345 Via Nizza, Turin** **FRANCE, 54 Blvd. Victor-Hugo St. Ouen, Paris**

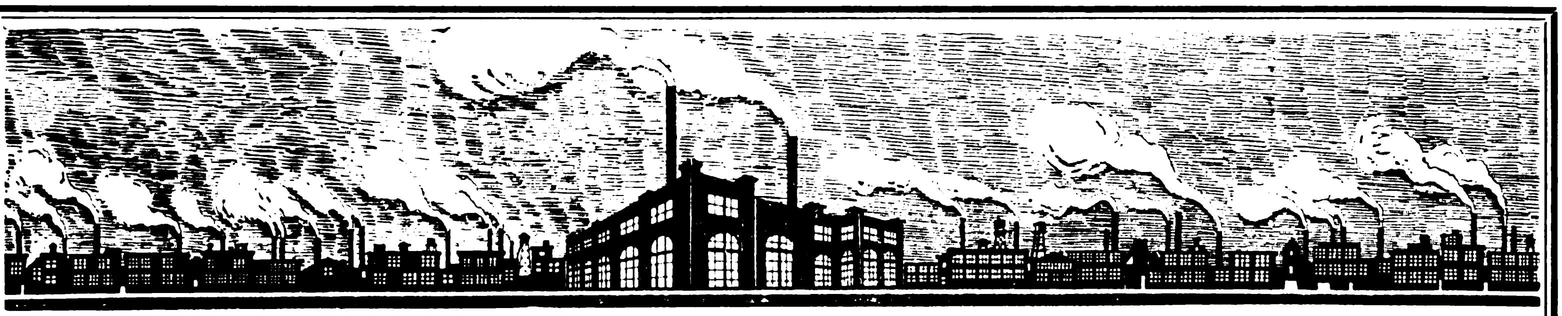
FOREIGN REPRESENTATIVES:

INDIA
Alkin and Duff Eng. Co.,
Clive Building, Calcutta

CHINA
Allied Machinery Co. of America,
Shanghai, Tientsin, Dairen, Manchuria

JAPAN
Horne Co., Ltd.
Tokyo, Osaka

No. 242



ELECTRICAL SUPPLIES

Generators, switchboards, transformers, motors and controlling apparatus
Bare and insulated wire and cable
Meters and instruments
Line hardware and tools
Lamps, fans, wiring devices, fixtures and glassware
Storage batteries and dry cells
Telephones, bells and accessories
Domestic appliances
Electric commercial vehicles
X-ray equipment

Andersen, Meyer & Co., Ltd.

SHANGHAI, CHINA

Branch Offices:

Canton, Hankow, Hongkong,
Kalgan, Mukden, Peking,
Tientsin, Tsinan, Urga

Telephone Central 778

Cable "Danica"

Harbin and Vladivostock Agents: AMERICAN COMMERCIAL AND INDUSTRIAL CO., LTD.

New York Office: 80 Wall Street

STANDARD OIL COMPANY OF NEW YORK

26 Broadway New York

The Mark of Quality

SOCONY PRODUCTS

Illuminating Oils Lubricating Oils

Gasoline and Motor Spirits

Lamps, Stoves and Heaters

Road Oils and Material for Road Building

Paraffine Wax and Candles

BRANCH OFFICES IN PRINCIPAL CITIES OF

Japan	Siam	India
China	Philippine Islands	South Africa
Indo-China	Straits Settlements	The Levant
	Netherlands India	

THE

HONGKONG & WHAMPOA DOCK CO.

LIMITED,

HONGKONG

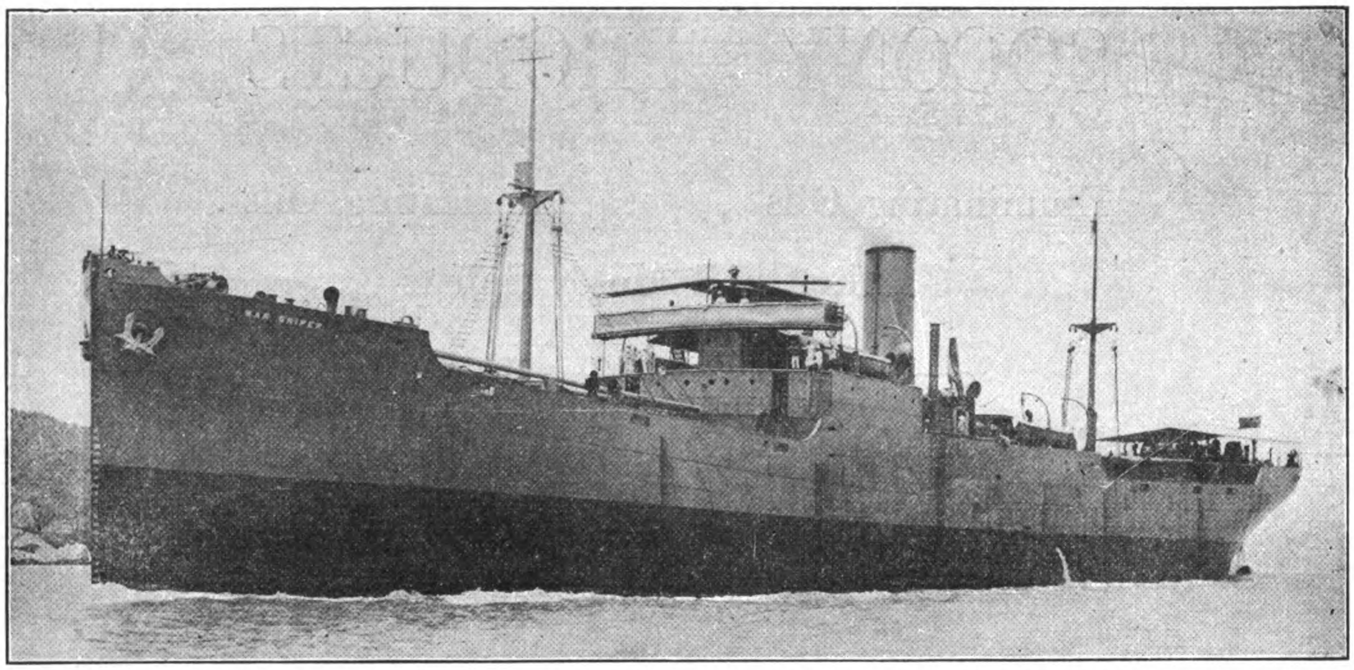
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

With Steel Plate or Cast Iron Frames

Agents for China:—

The Anglo-Chinese Engineers' Association, Ltd.

in Association with Reiss & Co.

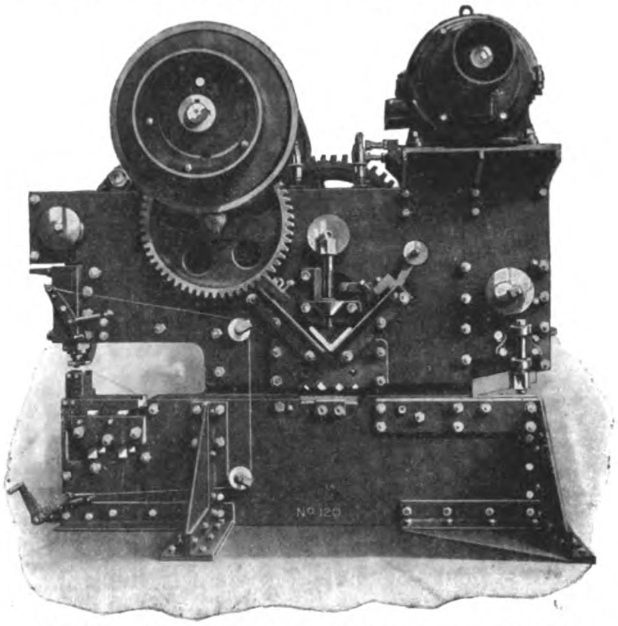
Address:—

Ice House St., Hongkong

7 Hankow Rd., Shanghai

Liddell Buildings, Yaku Road, Tientsin.

52 Dar Farng Chia Hutung, Peking.



Punching, Plate Splitting and Bar Cropping Machine

Punching and Shearing Machines.

Plate Bending Machines.

Plate Straightening Machines.

Plate Edge Planing Machines.

Plate Shearing Machines.

Steam Bending and Straightening Machines.

Bar Cropping Machines.

Multiple Punching Machines.

etc. etc.

CRAIG & DONALD LIMITED

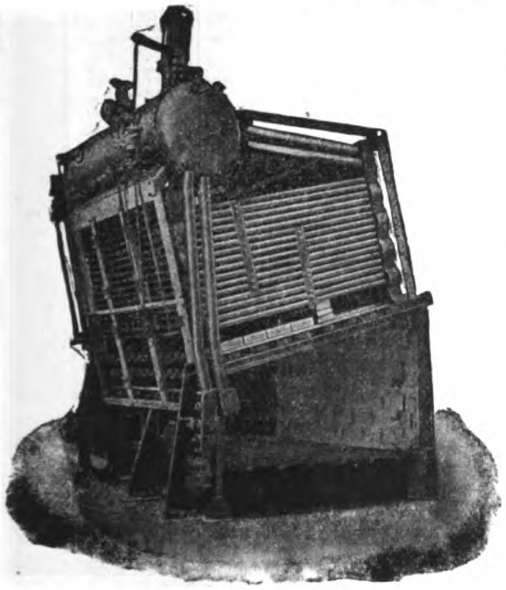
Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LTD.

PATENT

WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES, AND FOR BURNING ANY KIND OF FUEL

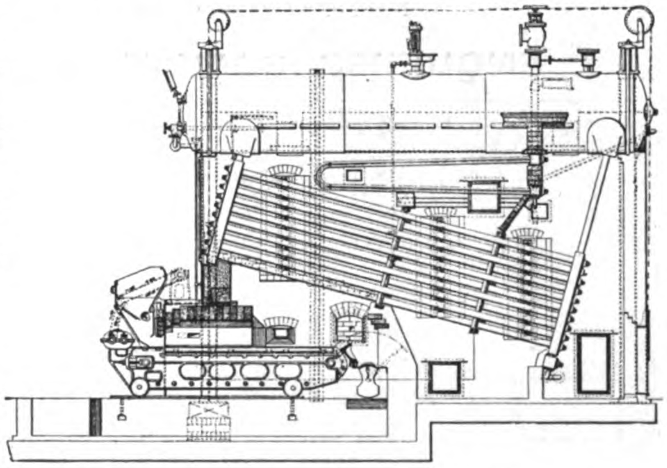


Babcock & Wilcox Marine Boiler

ADVANTAGES:

Simple in Design. Easy to Clean
Constructed of Wrought Steel. Rapid Steam Raiser
Economical in coal. Economical in Repairs
Very Durable. All Straight Tubes
No Screwed Joints. No Cast Metal
No joints exposed to the Fire
Rapid Circulation of Water
Steady Water Level
Large Steam Space
Installed in many large installations in China and Japan

13,400,000 H.P. Land-type For Stationary Purposes—**6,400,000 H.P.** Marine-type Afloat



BABCOCK & WILCOX LAND BOILER, fitted with Patent Superheater and Chain Grate Stoker

MANUFACTURERS OF

Steam Superheaters
Feed-Water Heaters
Coal Conveyors
Suction Ash Plants
Economisers
Water Softeners and Purifiers
Structural Steel Work
Mechanical Stokers
Steal Chimneys
Electric Cranes

For Burning Chinese and Japanese Coal Smokelessly
Complete Steam Piping Plants and all Boiler-House Accessories.
Also White-Forster Water-Tube Marine Steam Boilers.

Head Office in China: 1 THE BUND, SHANGHAI
,, ,, ,, Japan: 1 1-CHOME, YURAKU-CHO, KOJIMACHIKU, Tokyo

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

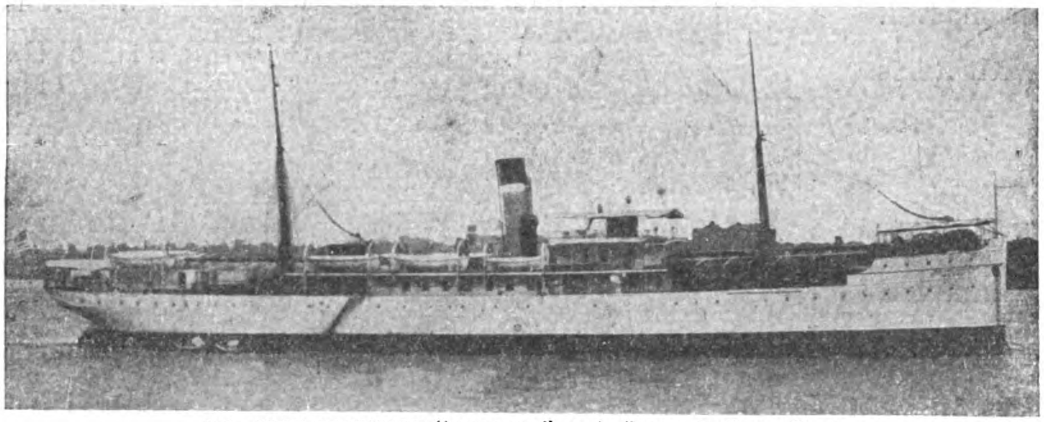
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300' 0" × 45' 0" × 28' 3"

Cable Address "FARNHAM" Codes Used, A.B.C. 4th, 5th & 6th Editions A-1, Watkin's, Scott's, Western Union, Bentley's and Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are four in number, ranging in length from 355 feet to 700 feet on the Blocks, and breadth of entrance from 53 feet to 80 feet, with a depth of water on the sill of from 16 feet to 27 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Low Pressure Hot Water and Steam Heating Installations

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR **"F.B."** INTERNATIONAL CODE

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

ENQUIRIES SOLICITED

Light railway lines are laid throughout workshops and yards.

A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

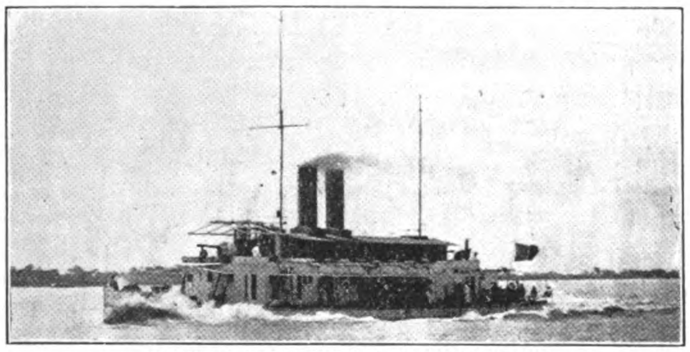
Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

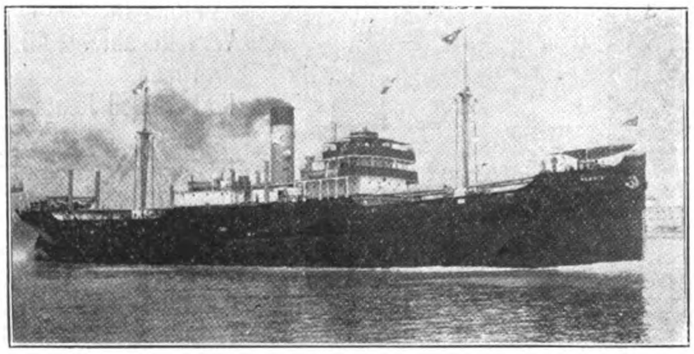
Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

PARTICULARS OF DRY DOCKS

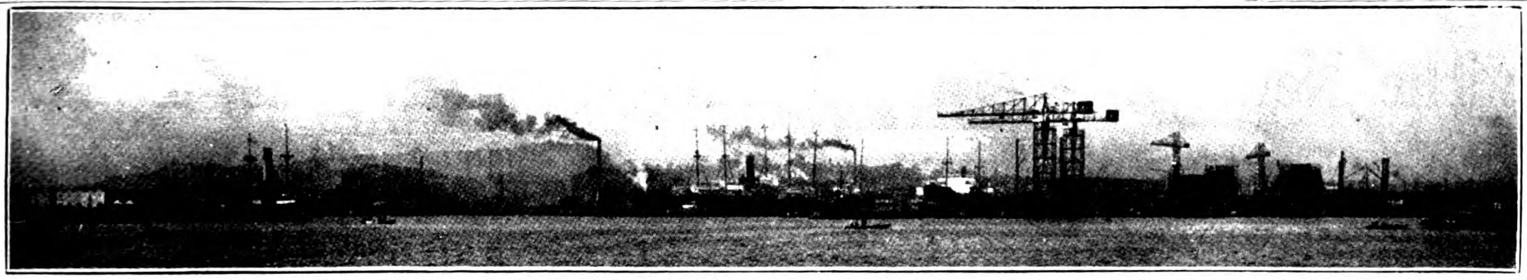
Names	Length on Blocks	High Water: Breadth of Entrance	High Water: Depth of water on Sill
Cosmopolitan Dock ...	700 feet	80 feet	27 feet
International Dock ...	528 ,,	77 ,,	23 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,



H.I.M.S. "ERMANNO CARLOTTO"
Designed and Constructed for the Royal Italian Navy
Length 160 feet. Twin Screw Engines.
Draft 2 feet 10 inches with full equipment and 30 tons of coal on board. Mean continuous speed 14 knots per hour.



s.s. "YANNIS" ex "WAR TIARA"
Sister Ship s.s. "PANAGIS" ex "WAR DIADEM"
Sister Ship s.s. "MELLON" ex "WAR REGALIA"
Built for the British Government.



View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

Head Office: Nagasumi-cho :: *Warehouse Office:* Midori-cho

Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
"DOCK"
Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:

No. 1	625′ × 80′ × 28′		
No. 2	380′ × 50′ × 26′		
No. 3	480′ × 63′ × 21½′		

SHIPBUILDING BERTHS:

No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4 } No. 5 }	680′ × 38′

WAREHOUSES:	TSUBO.
Iron Building	8,871.57
Concrete Building	1,636.99
Brick Building	2,011.72
Others	5,807.74

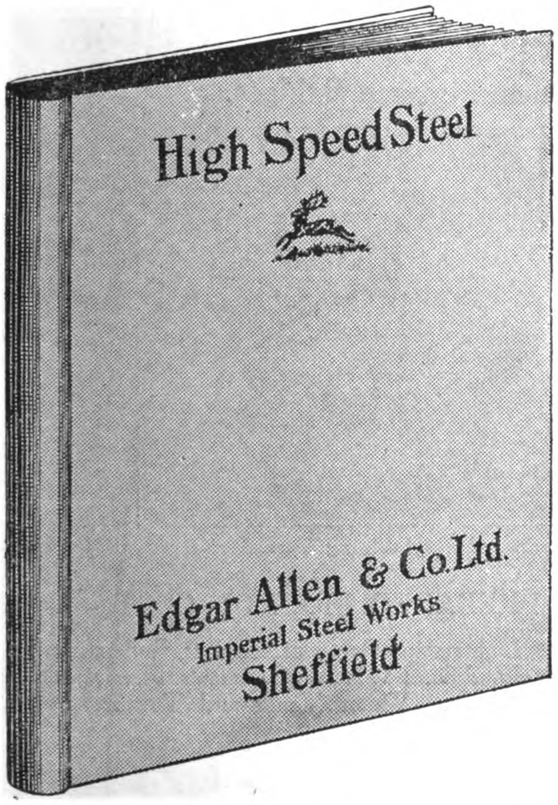
Directors: TOSHINOBU SUDA, Esq. *(Chairman)*, MANKICHI MIYANAGA, Esq. *(Managing Business Dept.)*, TAMATARO TOJO, Esq. *(Managing Shop Dept.)*

Agencies: NIPPON YUSEN KAISHA, London Branch. NIPPON YUSEN KAISHA, New York Branch.

All situated in Yokohama Harbour, the First Port at which Trans-Pacific Steamships arrive, and the Last Port from which they depart.

Complete Facilities for every Work and Fully Equipped up to date for

All Repairing Work. All Engine Work. All New Ship Work. All Boiler Work.



This Book Helps!

How to order High Speed Steels, how to heat-treat them, the speeds and feeds for turning different classes of work, and many other matters of importance to steel users, are dealt with in the new booklet issued by Edgar Allen & Co., Ltd. Every tool-user and/or tool buyer should have it in his possession. Reference is also made to ready-hardened lengths, toolholder-bits, discs for milling cutters, and so on.

Edgar Allen

"High Speed Steel" will be sent on request, providing the information indicated on the Request Form is given by the applicant.

Edgar Allen & Co Ltd
Imperial Steel Works
Sheffield

Agents:

Messrs. Jardine, Matheson & Co., Ltd.,
Engineering Department,
8a Yuen-Ming-Yuen Road, Shanghai, China

Messrs. Edgar Allen & Co., Ltd.,
2 Mitsu Bishi Buildings,
1 Yaesu-Cho, Kojimachi-ku. Tokyo, Japan

To
Edgar Allen & Co., Limited
Imperial STEEL Works, Sheffield.
Please post "High Speed Steel" to
Name
Firm
Address
E.P.

Pin the Request Form to your letter, and a copy will be sent by return.

The New Engineering & Shipbuilding Works, Ltd.

PROPRIETORS OF THE YANGTSZEPOO DOCK

SHANGHAI, CHINA. CABLE ADDRESS, "SPEEDY"

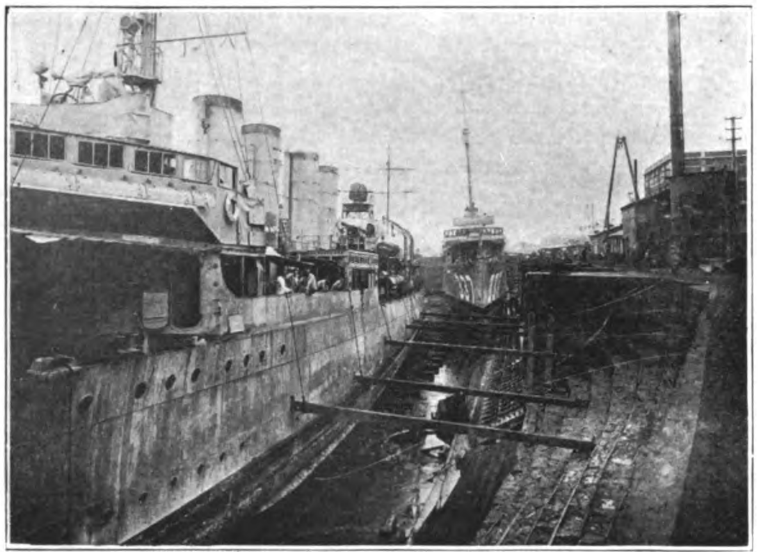
Call Flag Inter "A"

DOCK PROPRIETORS AND SLIP OWNERS

YANGTSZEPOO DOCK

Length ....577″
Entrance ....70″
Width of Sill ....60″
Depth on Sill ....20″

PATENT SLIPS
For Vessels up to 200 feet long

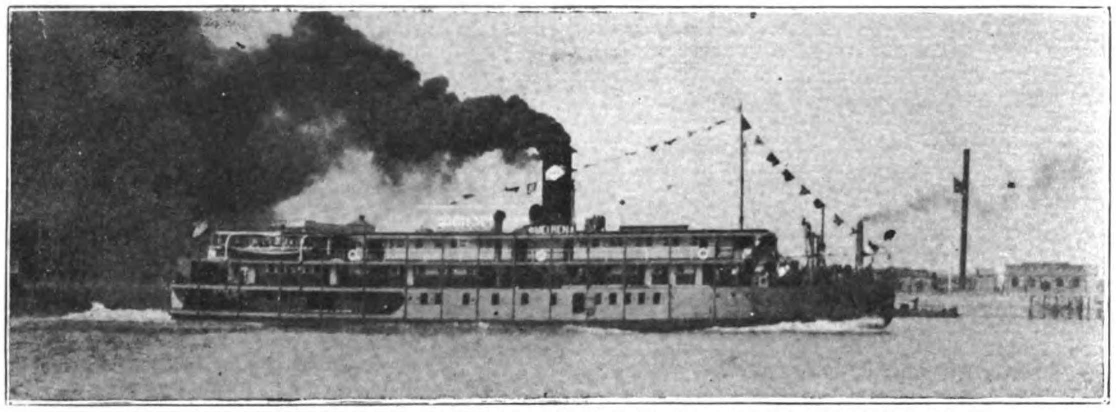


U. S. Destroyer in Dock

Vessels docked at Short Notice. All Repairs Carried out Efficiently and Expeditiously at Moderate Rates under European Supervision.

SHIPBUILDERS, SHIP-REPAIRERS, BOILERMAKERS, ELECTRICIANS, BLACKSMITHS, FOUNDERS, WELDERS, SALVAGE EXPERTS, MANUFACTURERS OF THE "SPEEDY" MOTOR

Makers under Royalty of Sturrock's Patent Furnace Bridges.



200-feet Upper Yangtsze Steamer Built at the New Engineering & Shipbuilding Works.

ESTIMATES, DESIGNS AND SPECIFICATIONS PREPARED FREE OF COST

for the construction of all classes of Steamers, Tow-boats, Launches, Lighters and Pontoons, Engines, Boilers and Condensing Plants, Pumps and Hoisting Engines, Structural Steel and Steel Window Casements, Power Plants for Mills and Filatures, Electrical Power and Light Installations, Water Tanks and Towers.

SOLE REPRESENTATIVES FOR

KITCHEN'S REVERSING RUDDERS

This Rudder Greatly Improves Engine Efficiency and Economy, Reduces Wear and Tear to a Minimum, and Improves the Steering and Manœuvring Qualities of the Vessel at all Speeds.

Cable Address:
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO., LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

DAIREN, N.-C.,
Dockyard & Engineering Works

HYOGO, KOBE
Steel Foundry, Bar Mill and Railway Shops

FUKIAI, KOBE
Plate Mill

BUILDERS OF

BATTLESHIPS, CRUISERS, TORPEDO-BOATS, DESTROYERS, SUBMARINES

ALSO, BUILDERS OF

FIRST-CLASS HIGH-SPEED OCEAN STEAMERS OF THE LARGEST SIZE AND POWER

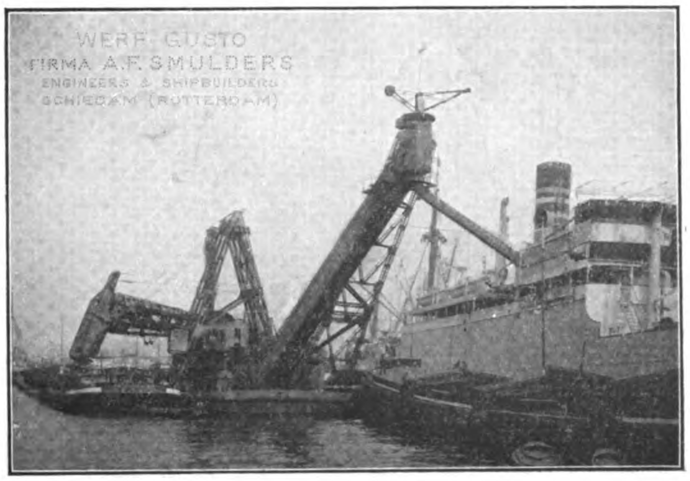
WERF GUSTO (FIRMA A. F. SMULDERS)

SHIPBUILDERS & ENGINEERS

SCHIEDAM, HOLLAND

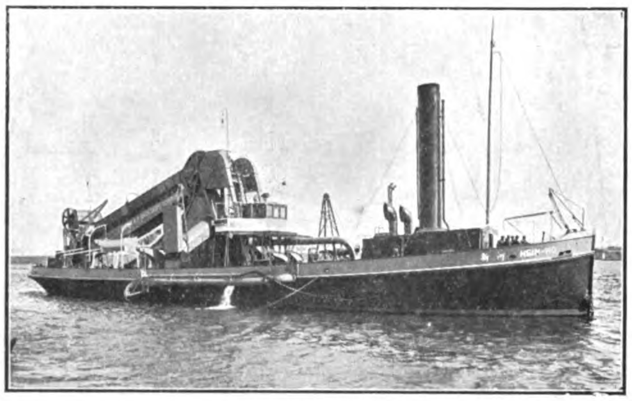
SOLE AGENT FOR UNITED KINGDOM **ANDERSON RODGER**

Tel. Vict 3887 38 VICTORIA STREET, LONDON, SW 1.



COALING ELEVATOR

Coaling Elevator 'Westfalen' with a guaranteed contractual output of 600 tons per hour, which ran up to 1,000 tons at the trial.



DREDGER "SIN-HO"

Sea-going twin-screw bucket and trailing suction dredger with force pump.

FLOATING CRANES of great power from 50 to 400 tons and more (of late years we supplied 24 of these cranes from 60 to 400 tons.)

DREDGING PLANT of all types up to the largest capacities.

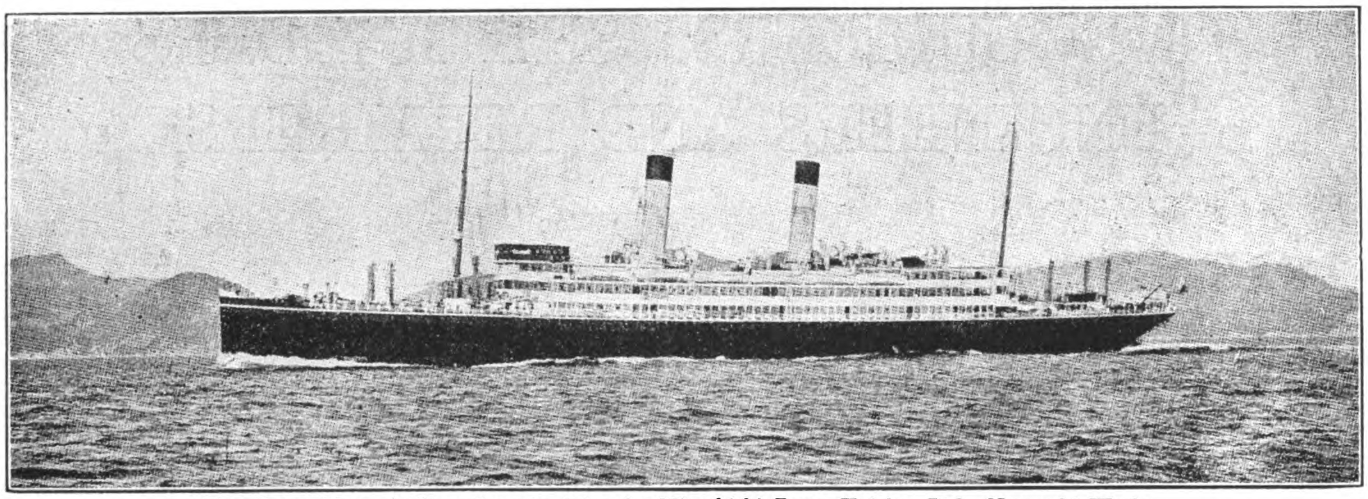
COALING VESSELS AND COALING ELEVATORS for bunkering steamers mechanically at rates from 150 to 1,000 tons per hour and upwards.

PASSENGER AND CARGO VESSELS, TANK STEAMERS, TUGS, Etc.

BOILERS of all kinds, land and marine.

BRIDGE, ROOF & CONSTRUCTIONAL STEEL WORK of every description by our Boiler and Girder Works.

A. F. SMULDERS, Grace Berleur, n/c Liege, Belgium.



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

DOCK No. 1			DOCK No. 2			DOCK No. 3		
Extreme Length	523	Ft.	Extreme Length	371	Ft.	Extreme Length	728.9	Ft.
Length on Blocks	513	,,	Length on Blocks	350	,,	Length on Blocks	714	,,
Width of Entrance on Top	89	,,	Width of Entrance on Top	66	,,	Width of Entrance on Top	99½	,,
,, ,, ,, ,, Bottom	77	,,	,, ,, ,, ,, Bottom	53	,,	,, ,, ,, ,, Bottom	88½	,,
Water on Blocks at Spring Tide	26½	,,	Water on Blocks at Spring Tide	24	,,	Water on Blocks at Spring Tide	34½	,,

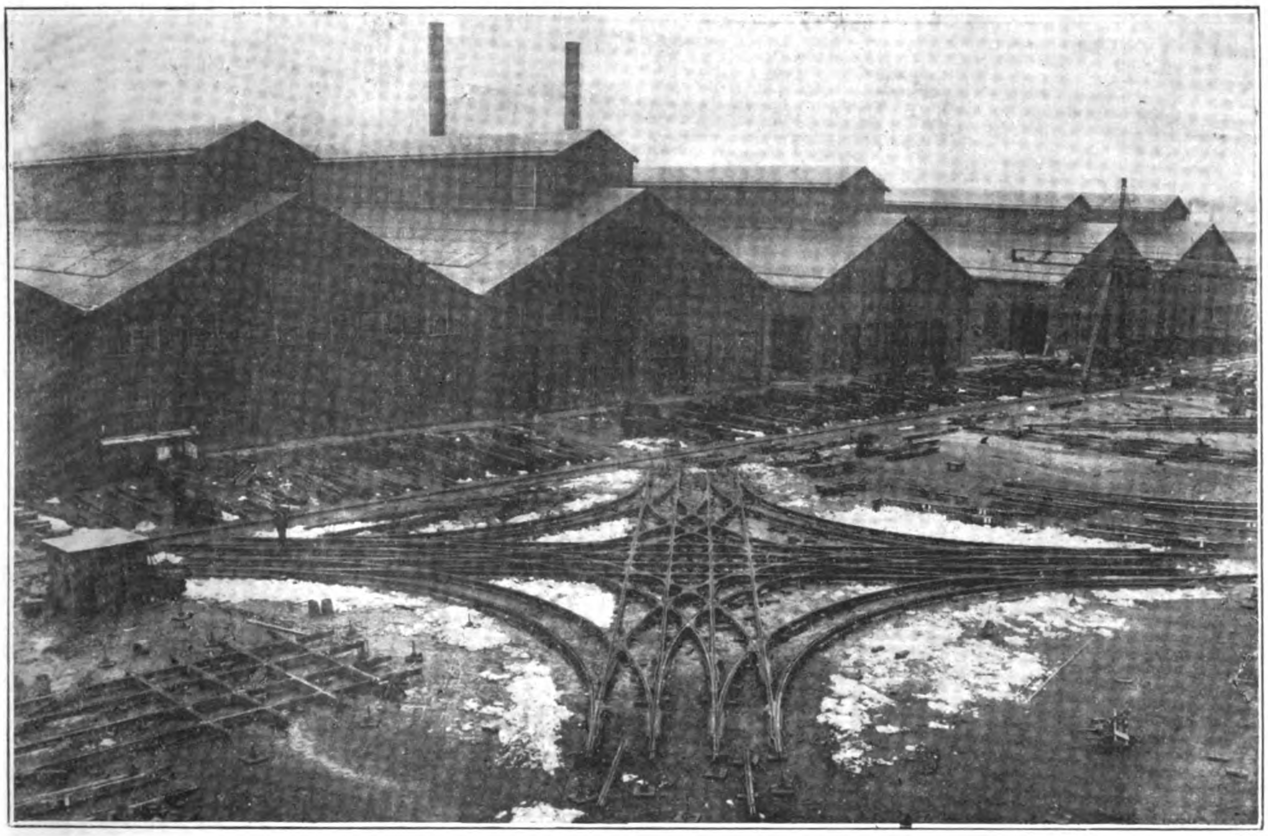
THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
Also Electrical Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND

LORAIN

Special Track Work



The Standard Tramway Construction Throughout the World

UNITED STATES STEEL PRODUCTS CO.

UNION BUILDING
THE BUND AND CANTON ROAD
SHANGHAI
CHINA

15 NAKADORI MARUNOUCHI
TOKYO, JAPAN

22 WU LIANG TA JEN HUTUNG
PEKING, CHINA

MITSUBISHI IRON AND STEEL CO., LTD.

(MITSUBISHI SEITETSU KAISHA, LTD.)

HEAD OFFICE: MARUNOUCHI, TOKYO

CAPITAL: (PAID UP) YEN 30,000,000

MILL (LLOYD'S APPROVED) KENJIHO, CHOSEN (KOREA)

PRODUCTS PIG IRON—Basic & Foundry 100,000 tons.

STEEL—High Tensile & Mild Steel 50,000 tons.

BY-PRODUCTS—Sulphate of Ammonia; Pitch; Naphthalene; Tar Oil (light, middle, heavy); Slag-Cement, Slag Wool.

Sales Agents: **The Mitsubishi Trading Company, Limited**

BRANCHES AND AGENCIES: Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

MITSUBISHI MARINE & FIRE INSURANCE Co., Ltd.

MITSUBISHI KAIJO KASAI HOKEN K. KAISHA

Head Office:

MARUNOUCHI, TOKYO

SUBSCRIBED CAPITAL - - Yen 5,000.000

PAID-UP CAPITAL - - - „ 1,250.000

Branches and Agencies:

LONDON, NEW YORK, OSAKA, KOBE, SHANGHAI, AND OTHER IMPORTANT CITIES AND PORTS IN THE WORLD

MITSUBISHI WAREHOUSE CO., LD.

(MITSUBISHI SOKO KAISHA, LTD.)

LANDING, SHIPPING AND FORWARDING AGENTS, STEVEDORES, CUSTOMS BROKERS & WAREHOUSEMEN

Head Office: MARUNOUCHI, TOKYO

Branches: TOKYO, YOKOHAMA, KOBE, OSAKA AND MOJI

General Managers of the

KYODO UNYU KAISHA

YOKOHAMA

3 KAIGAN-DORI, ITCHOME

YOKOHAMA

WITH TWO BRANCHES IN TOKYO

BRILL TRAMCARS

The construction of electric tramcars and trucks for service all over the world has engaged the facilities of the Brill Organization for the past 48 years.

East, West, North and South Brill-built tramcars and trucks have gone to live up to that reputation for correctness of design and workmanship that is largely responsible for the development of the Brill business to a place of international importance.

THE J. G. BRILL COMPANY

Philadelphia, Pa., U.S.A.

FAR EAST REPRESENTATIVES

ANDERSEN, MEYER & CO., LTD.
SHANGHAI

PACIFIC COMMERCIAL CO.
MANILA

Superior Barrel Shooks Bear This Trade Mark

Made by CALIFORNIA BARREL CO., San Francisco

THE KOSTER COMPANY

12 NANKING ROAD, SHANGHAI

FOREIGN MANAGERS

CALIFORNIA BARREL CO.

OF SAN FRANCISCO

CABLES "KOSTER"
ALL CODES

TOSHIN SOKO

KABUSHIKI KAISHA

WAREHOUSING, FORWARDING AND EXPRESS CO.

WAREHOUSEMEN LANDING AND SHIPPING

STEVEDORES CUSTOM BROKERS

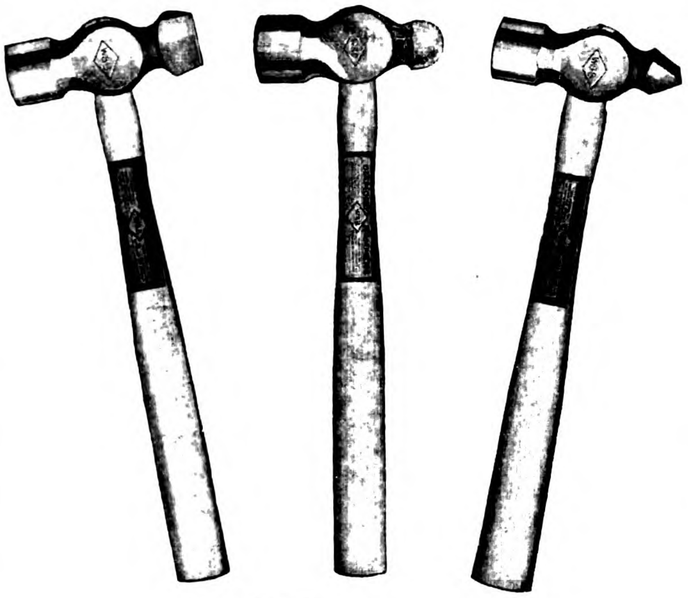
WAREHOUSING AREA - - - - - - - - - 77,000 tsubo (308,000 Sq. yds.)
VALUE OF GOODS IN WAREHOUSE (latest date) - - - Yen 100,000,000
CAPITAL (PAID UP) - Yen 5,000,000; RESERVE FUND - Yen 4,459,500

President: TOKUEMON MITSUI
Managing Directors: H. OKUMURA and R. KADONO
Directors: K. HAYASHI and K. FUKUI
Auditors: T. MITSUI and T. MAJIMA

HEAD OFFICE: No. 5 HONKAWAYA-CHO, NIHONBASHI-KU, TOKYO

BRANCHES and SUB-BRANCHES:

TOKYO—Hakozaki-cho, Fukagawa-ku
OSAKA—Nakanoshima, Nishi, Utsubo, Ajikawa, Nishinari, Sakurashima Chikuko
YOKOHAMA—Shinko-cho
KOBE—Kano-cho
MOJI—Hama-cho
SHIMONOSEKI—Kannonzaki-cho



MADE IN CANADA

WILLIAMS' SUPERIOR DROP-FORGED HAMMERS

Are dependable tools because :—

Their heads, drop-forged from a special grade of tough steel, carefully hardened and tempered, neither crack, chip nor splinter.

They are fastened most securely and solidly to the handles—can't work loose—can't fly off.

Their handles are made of the best grade of clear, straight-grained hickory, flared at the grip to prevent hand-slip.

The weight and length of each tool are properly proportioned to give perfect balance, and, hence, increased striking power.

Williams' Superior Hammers of all kinds and sizes.
Catalog on request.

J. H. WILLIAMS & CO., Ltd.

" The Drop-Forging People "

Works : St. Catharines, Canada

Export Office:
124 State Street,
New York, U.S.A.

London Representative :
Benj. Whittaker, Ltd.,
Department K.
56 Ludgate Hill, E. C. 4.

MADE IN CANADA

CIGARETTE MACHINERY

800 Cigarettes per Minute!

PLAIN OR TIPPED ON

Our New " Triumph-Model U.G." Cigarette Machine

The phenomenal speed of this machine, its supreme simplicity and its low cost of upkeep, are due to the revolutionary improvements in its design and construction—the outcome of 40 years of experience in the manufacture of cigarette machinery.

This machine is an indispensable part of the equipment of any modern up-to-date factory. Old modern machines are rapidly being replaced. The measure of your success depends on your cost of production.

Write for full particulars to-day on our—

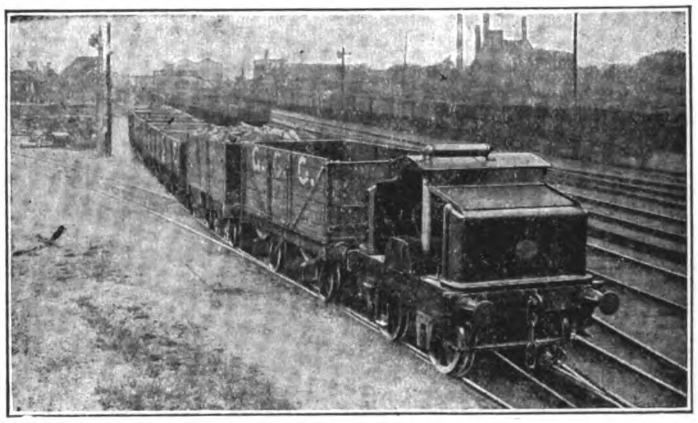
CIGARETTE MACHINES
TOBACCO STEMMING MACHINES
AUTOMATIC KNIFE GRINDERS
CIGARETTE PACKING MACHINES

UNITED CIGARETTE MACHINE CO., Inc.,
Lynchburg, Va., U.S.A.

MOTOR RAIL & TRAM CAR CO., LTD.

LIGHT RAILWAY ENGINEERS

Manufacturers of Internal Combustion Engines; Locomotives, Rail-Inspection and Tramcars



40 H.P. Loco Working on Main Line Siding

These vehicles are thoroughly reliable, economical, inexpensive to maintain, easily handled and entail no stand-by losses

All kinds of Light Railway Material supplied

ENQUIRIES SOLICITED

WORKS & OFFICES:
Telegrams & Cables: Motral-Bedford
Codes: A.C.B. Engineering 5th Ed & Bentley

SIMPLEX WORKS:
Bedford, England

THE BLUE FUNNEL LINE

(Ocean Steam Ship Co., Ltd. & China Mutual S.N. Co., Ltd.)

FAST SERVICES:—

Japan, China, Hongkong, Philippines, Straits and Java to Europe via Suez Canal and to New York via Suez and Panama Canals also

Trans-Pacific between Oriental ports and West Coast of N. America.

Agents: **BUTTERFIELD & SWIRE**

CHINA NAVIGATION CO., LTD.

(PASSENGER AND FREIGHT STEAMSHIP SERVICES)

SHANGHAI TO, AND FROM,

Weihaiwei, Chefoo and Tientsin (for Peking); Newchwang; Antung.
Hankow, Ichang (with connection to Chungking), Changsha, and Intermediate Yangtsze Ports.
Hongkong and Canton; Amoy and Swatow; Ningpo; and General Coasting Services.

HONGKONG TO, AND FROM,

Manila, Cebu, and Iloilo
Weihaiwei, Chefoo and Tientsin (for Peking)
Canton; Hoihow, Pakhoi and Haiphong; Bangkok and Singapore.
Shanghai and Yangtze Ports (as above)
Sydney, Melbourne and Australian Ports (Australian-Oriental Line)

Agents: **BUTTERFIELD & SWIRE**

FIRE AND MARINE INSURANCE

FIRE

London and Lancashire Insurance Co., Ltd.
Royal Exchange Assurance Corporation.
Guardian Assurance Co., Ltd.
Orient Insurance Company.
British Traders Insurance Co., Ltd.

MARINE

British and Foreign Marine Insurance Co., Ltd.
Standard Marine Insurance Co., Ltd.
Royal Exchange Assurance Corporation.
Sea Insurance Company, Ltd.
Guardian Assurance Co., Ltd.

Agents: **BUTTERFIELD & SWIRE**

TAIKOO SUGAR REFINING CO., LTD.

FINEST CANE SUGARS

General Agents: **BUTTERFIELD & SWIRE**

TAIKOO DOCKYARD & ENGINEERING CO.

OF HONGKONG, LTD.

SHIPBUILDERS, SHIP REPAIRERS, ENGINE BUILDERS, BOILERMAKERS, ETC.

Agents: **BUTTERFIELD & SWIRE**

Telephone No. 4881 Central. Private Exchange to all Departments

BUTTERFIELD AND SWIRE

Hongkong, Shanghai, Ningpo, Chinkiang, Nanking, Wuhu, Kiukiang, Hankow, Changsha, Ichang, Tientsin, Newchwang, Harbin, Dairen (Dalny), Tsingtau, Chefoo, Foochow, Amoy, Swatow, Canton, Yokohama, Kobe.

KOKUSAI KISEN KAISHA

Nominal Capital	- -	Yen 100,000,000.00
Paid-up Capital	- -	„ 87,500,000.00
Aggregate Tonnage	- -	500,000 Tons

FLEET OF STEAMSHIPS

Name	Tons D.W.	Name	Tons D.W.
Rozan-Maru	8,700	Seifuku-Maru	9,100
Vancouver-Maru	9,100	Suez-Maru	6,600
Boston-Maru...	8,800	Daio-Maru	9,000
Tofuku-Maru	9,100	Kashu-Maru	8,800
Chifuku-Maru	9,100	No. 2 Kifunesan-Maru	5,000
Ryufuku-Maru	9,100	Yousan-Maru	5,000
Hankow-Maru	6,400	Taisan-Maru	5,000
Yoni-Maru	11,000	Yuri-Maru	11,000
Taibu-Maru	8,900	Texas-Maru	11,000
San Francisco-Maru	9,100	Tamatsu-Maru	6,600
Naple-Maru	9,100	Eifuku-Maru	9,100
Glasgow-Maru	9,100	Kifuku-Maru	9,100
Yayoi-Maru	8,700	Toyofuku-Maru	9,000
Yaye-Maru	11,000	Raifuku-Maru	9,100
Malta-Maru	8,700	Keifuku-Maru	9,100
Buyo-Maru	8,800	Washington-Maru	9,100
Brazil-Maru	9,100	Tokufuku-Maru	9,100
Kofuku-Maru	9,100	Portland-Maru	9,100
Yezari-Maru	6,900	England-Maru	9,100
Yugao-Maru	5,000	Chili-Maru	9,100
Yubaye-Maru	5,000	Argentine-Maru	9,100
Sydney-Maru	6,400	Port Said-Maru	9,100
Shanghai-Maru	6,400	New York-Maru	9,100
Singapore-Maru	9,100	Karorin-Maru	6,400
Jyufuku-Maru	9,100	Tasmania-Maru	6,400
Hiyeizan-Maru	6,700		

Head Office: No. 8 Kaigan-dori, Kobe

BRANCH OFFICE:

Tokyo Kaijo Building, Maruno-uchi, Tokyo, Japan

Osaka Shosen Kaisha

(Osaka Mercantile Steamship Co.)

HEAD OFFICE: OSAKA, JAPAN

Cable Address: "SHOSEN, OSAKA."

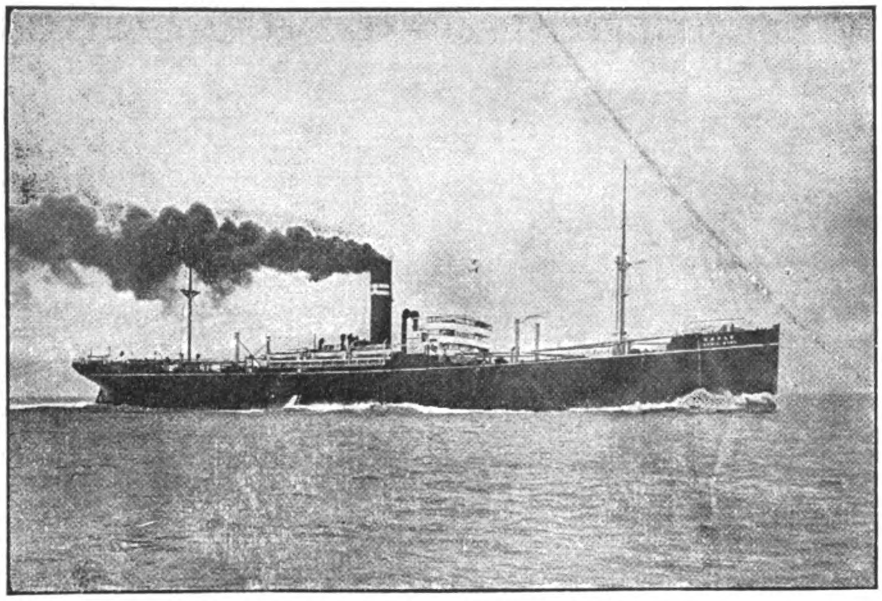
Branches and Agencies at all the important ports in the World.

Codes Used: A1, A.B.C. 5th Ed., Scott's 10th Ed. & Bentley's.

Capital: Y. 100,000,000

Reserves: Y 66,000,000

40 Regular Lines with a Fleet of 500,000 Tons Gross.



PRINCIPAL REGULAR LINES:

JAPAN-EUROPE LINE (via Suez)—Monthly—Ports of Call: Yokohama, Kobe, Moii, Shanghai, Hongkong, Singapore, Colombo, Port Said, Marseilles, London, Antwerp, Rotterdam and Hamburg.

JAVA-EUROPE LINE:—Monthly—Ports of Call: Sourabaya, Padan, Colombo, Port Sudan, Suez, Genoa, Marseilles, Antwerp and Hamburg.

CALCUTTA-NEW ORLEANS LINE: 7 sailings per annum—Ports of Call: Calcutta, Singapore, Hongkong, Nagasaki, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Cienfuegos and New Orleans.

SINGAPORE-NEW YORK LINE:—Monthly—Ports of Call: Singapore, Hongkong, Shanghai, Moji, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Havana and New York.

JAPAN-BOMBAY LINE:—Fortnightly—Ports of Call: Yokohama, Yokkaichi, Osaka, Kobe, Moji, Hongkong, Singapore, Colombo and Bombay.

HONGKONG-PUGET SOUND LINE:—Fortnightly—Ports of Call: Hongkong, Manila, Keelung, Shanghai, Nagasaki, Kobe, Yokkaichi, Shimizu, Yokohama, Victoria, Seattle, Tacoma and Vancouver.

JAPAN-SOUTH AMERICA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Nagasaki, Hongkong, Singapore, Colombo, Mauritius, Durban, Cape Town, Rio de Janeiro, Santos and Buenos Ayres.

JAPAN-AUSTRALIA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Osaka, Moji, Hongkong, Manila, Sydney, Melbourne and Adelaide.

JAPAN-JAVA LINE:—Monthly—Ports of Call: Osaka, Kobe, Moji, Keelung, Manila, Sandakan, Tawao, Batavia, Sourabaya and Macassar.

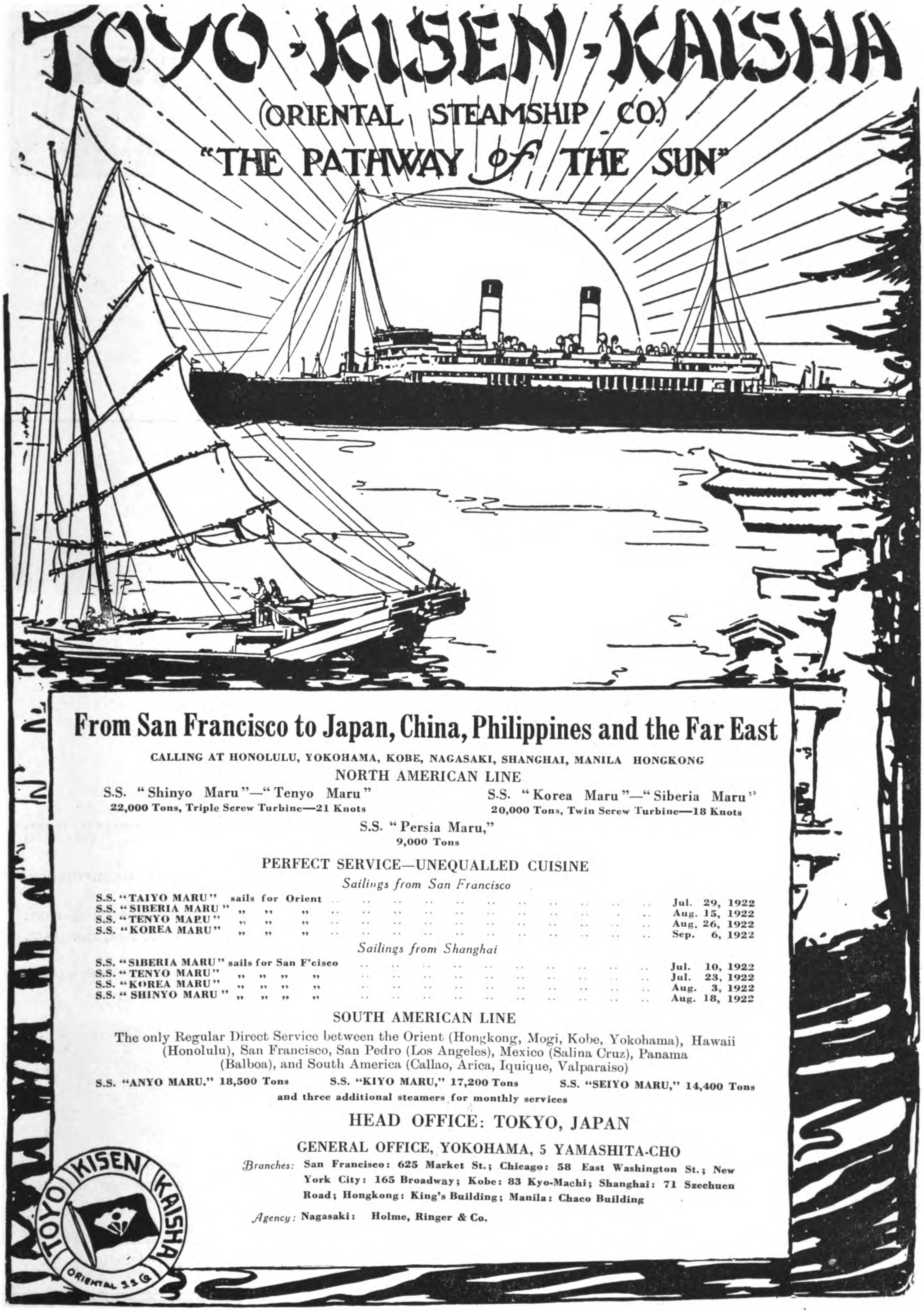
SERVICES TO CHINA.—

OSAKA—Dairen Line.—Semi-Weekly.
OSAKA—Tientsin Line.—6 Sailings per month.
OSAKA—Tsingtau Line.—2 Sailings per month.
YOKOHAMA—Dairen-Tientsin Line.—About 8 Sailings per month.
TAKAO—Tientsin Line.—2 Sailings per month.
Keelung-Hongkong Line.—Weekly.

Besides the above mentioned, Mail and Passenger Services are maintained by over THIRTY-FIVE REGULAR LINES, calling at all important ports in JAPAN, as well as STRAITS, DUTCH EAST-INDIES, FORMOSA, CHINA, KOREA, Etc., Etc.

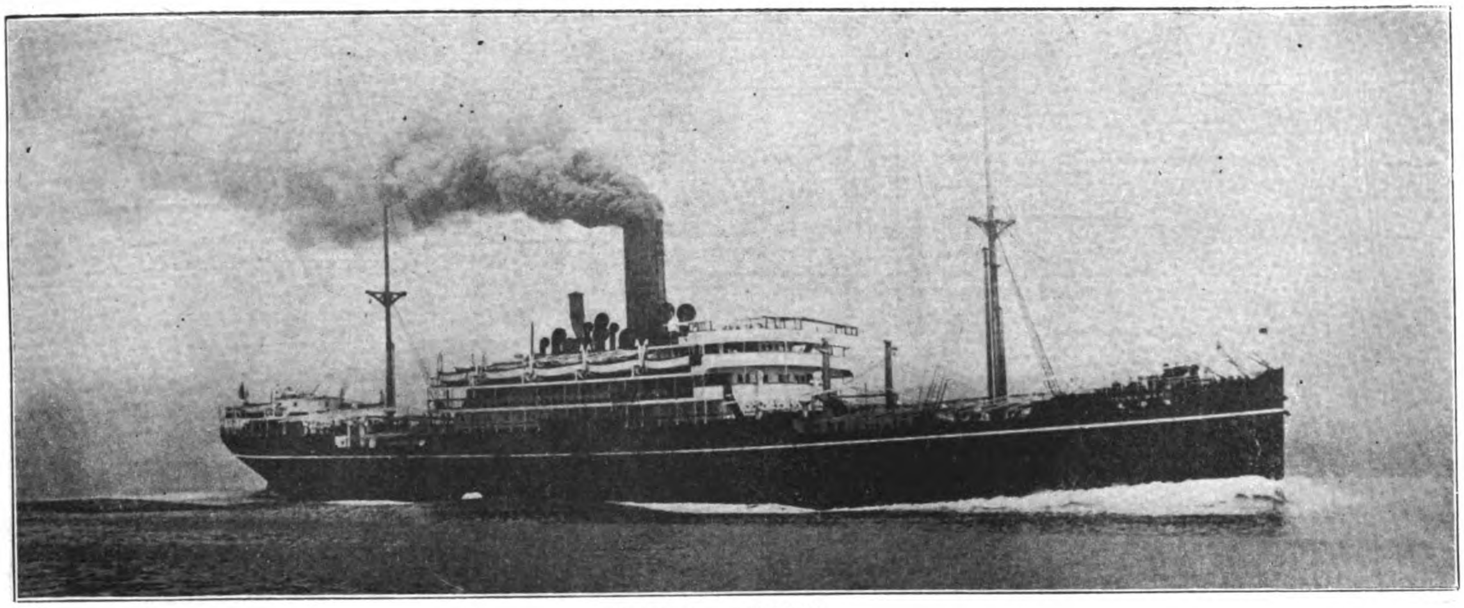
COMPANY'S LOCAL OFFICES IN CHINA

AMOY, CANTON, FOOCHOW, HANKOW, SHANGHAI, TIENTSIN, DAIREN, HONGKONG


TOYO KISEN KAISHA
(ORIENTAL STEAMSHIP CO.)
"THE PATHWAY of THE SUN"
From San Francisco to Japan, China, Philippines and the Far East
CALLING AT HONOLULU, YOKOHAMA, KOBE, NAGASAKI, SHANGHAI, MANILA HONGKONG
NORTH AMERICAN LINE
S.S. "Shinyo Maru"—"Tenyo Maru"
22,000 Tons, Triple Screw Turbine—21 Knots
S.S. "Korea Maru"—"Siberia Maru"
20,000 Tons, Twin Screw Turbine—18 Knots
S.S. "Persia Maru,"
9,000 Tons
PERFECT SERVICE—UNEQUALLED CUISINE
Sailings from San Francisco
S.S. "TAIYO MARU" sails for Orient .. .. Jul. 29, 1922
S.S. "SIBERIA MARU" " " " .. .. Aug. 15, 1922
S.S. "TENYO MARU" " " " .. .. Aug. 26, 1922
S.S. "KOREA MARU" " " " .. .. Sep. 6, 1922
Sailings from Shanghai
S.S. "SIBERIA MARU" sails for San F'cisco .. .. Jul. 10, 1922
S.S. "TENYO MARU" " " " " .. .. Jul. 23, 1922
S.S. "KOREA MARU" " " " " .. .. Aug. 3, 1922
S.S. "SHINYO MARU" " " " " .. .. Aug. 18, 1922
SOUTH AMERICAN LINE
The only Regular Direct Service between the Orient (Hongkong, Mogi, Kobe, Yokohama), Hawaii (Honolulu), San Francisco, San Pedro (Los Angeles), Mexico (Salina Cruz), Panama (Balboa), and South America (Callao, Arica, Iquique, Valparaiso)
S.S. "ANYO MARU." 18,500 Tons S.S. "KIYO MARU," 17,200 Tons S.S. "SEIYO MARU," 14,400 Tons
and three additional steamers for monthly services
HEAD OFFICE: TOKYO, JAPAN
GENERAL OFFICE, YOKOHAMA, 5 YAMASHITA-CHO
Branches: San Francisco: 625 Market St.; Chicago: 58 East Washington St.; New York City: 165 Broadway; Kobe: 83 Kyo-Machi; Shanghai: 71 Szechuen Road; Hongkong: King's Building; Manila: Chaco Building
Agency: Nagasaki: Holme, Ringer & Co.
TOYO KISEN KAISHA
ORIENTAL S.S. Co.

NIPPON YUSEN KAISHA

HEAD OFFICE, TOKYO, JAPAN



"SUWA MARU"

OVER THE

THE PALATIAL STEAMERS OF THE N.Y.K.

WILL CARRY YOU IN COMFORT, CLEANLINESS AND WITH COURTESY

PRINCIPAL SERVICES

EUROPEAN LINE (Fortnightly)

WEST COAST LINE (Monthly).
GLASGOW, BIRKENHEAD, AND SWANSEA (occasionally).
SINGAPORE, HONGKONG, SHANGHAI AND JAPAN.

NORTH CONTINENTAL LINE (Monthly).
HAMBURG, GRANGEMOUTH, ROTTERDAM AND ANTWERP.
STRAITS, JAVA, CHINA AND JAPAN.

NORTH AMERICAN LINE (Every 3 Weeks).
HONGKONG, MANILA, SHANGHAI, KOBE AND YOKOHAMA.
VICTORIA, B.C., AND SEATTLE.

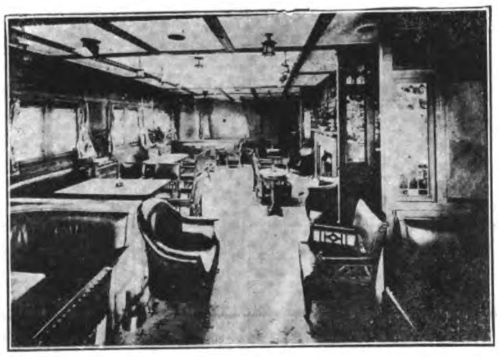
SOUTH AMERICAN LINE (Every 2 Months)
KOBE, SINGAPORE, DURBAN AND CAPETOWN.
SANTOS, RIO DE JANEIRO AND BUENOS AIRES.

AUSTRALIAN LINE (Monthly).
YOKOHAMA, KOBE, HONGKONG, MANILA, ZAMBOANGA, THURSDAY ISLAND, TOWNSVILLE, BRISBANE, SYDNEY AND MELBOURNE.

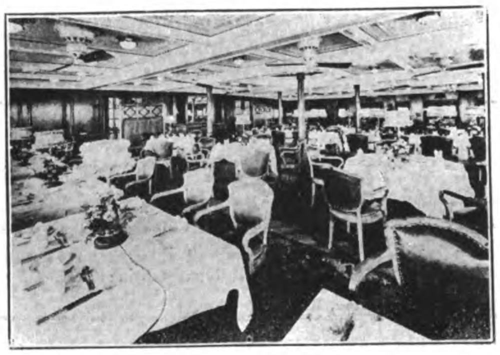
BOMBAY LINE (Fortnightly).
KOBE, SHANGHAI, HONGKONG, SINGAPORE, MALACCA, COLOMBO, TUTICORIN AND BOMBAY.

CALCUTTA LINE
(FORTNIGHTLY) YOKOHAMA, KOBE, HONGKONG, SINGAPORE, PENANG, RANGOON AND CALCUTTA.
(MONTHLY) CALCUTTA, MADRAS, COLOMBO, SUEZ, PORT SAID, ALGIERS AND NEW YORK.

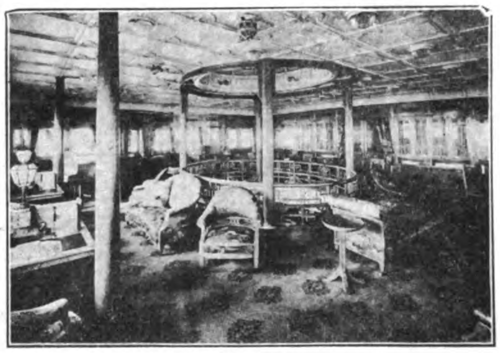
NEW YORK-FAR EAST LINE (Fortnightly)
KOBE, YOKOHAMA, SAN FRANCISCO, PANAMA, COLON, HAVANA AND NEW YORK.
NEW YORK TO JAPAN, CHINA AND PHILIPPINES.



Smoking Room



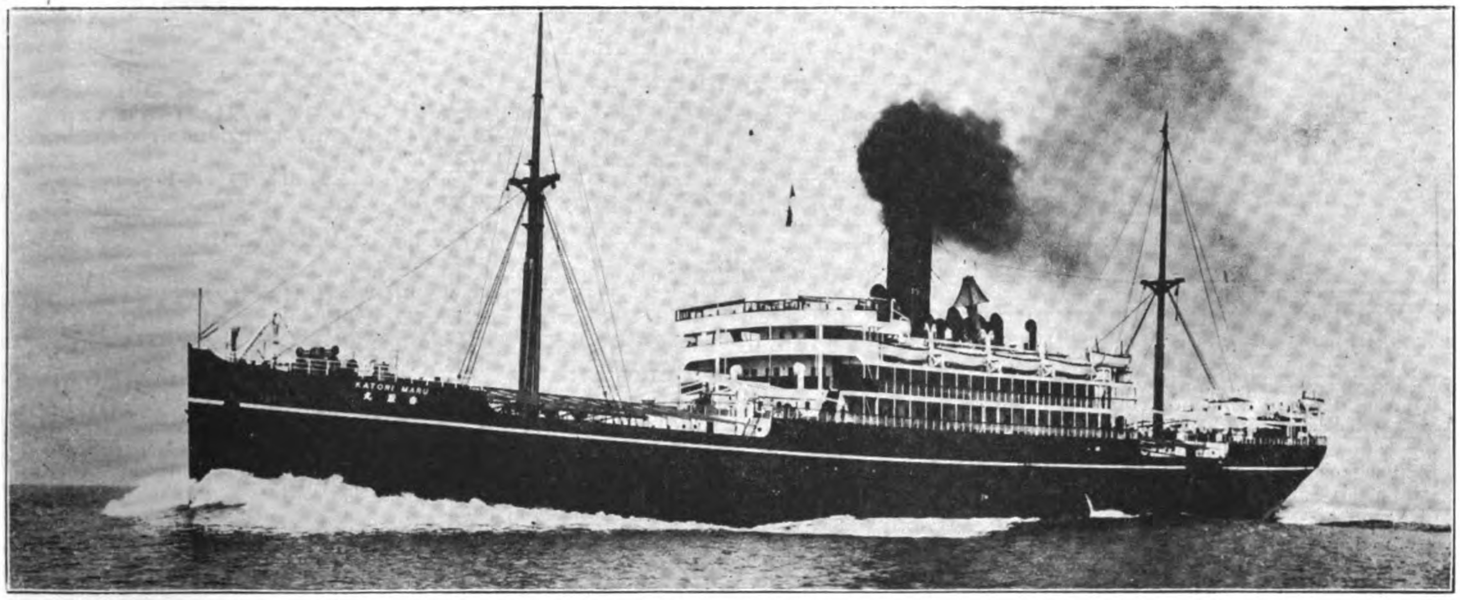
Dining Saloon



Social Hall

NIPPON YUSEN KAISHA

FLEET: 114 STEAMERS, 574,594 GROSS TONS



"KATORI MARU"

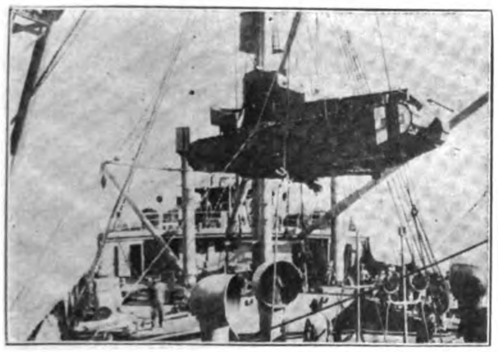
SEVEN SEAS

SHIPPERS WILL FIND QUICK DISPATCH, WITH WHARF, WAREHOUSE AND TERMINAL FACILITIES AT ALL PRINCIPAL PORTS SERVED BY N.Y.K. STEAMERS

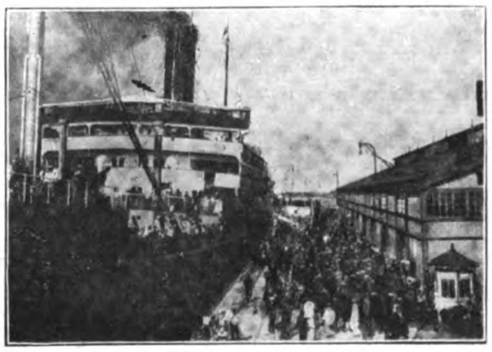
PRINCIPAL BRANCHES AND AGENCIES

Yokohama	Tokio	Nagoya	Keelung
Kobe	Moji	Nagasaki	Hankow
Hakodate	Otaru	Tientsin	Singapore
Tsingtao	Hongkong	Canton	Bombay
Penang	Colombo	Calcutta	Liverpool
Port Said	Marseilles	London	Chicago
Antwerp	Rotterdam	New York	Brisbane
Seattle	Manila	Townsville	Shanghai
Sydney	Melbourne	Osaka	

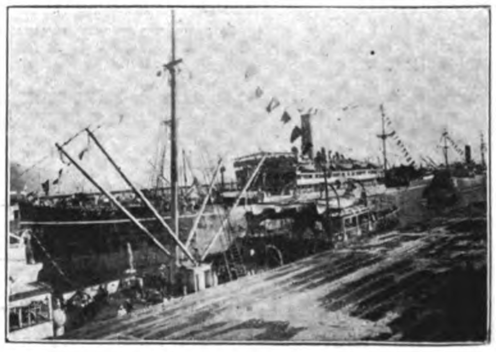
GIVE JAPANESE STEAMSHIPS THEIR SHARE OF YOUR JAPANESE CARRYING TRADE



Landing a Tank



Dock at Yokohama



Great Northern Dock at Seattle

Chartered Bank of India, Australia and China

INCORPORATED BY ROYAL CHARTER, 1853

Capital	**£3,000,000**
Reserve Fund	**£3,700,000**
Reserve Liabilities of Shareholders .	**£3,000,000**

Head Office: 38 BISHOPSGATE, LONDON, E.C.
Shanghai Branch: 18 THE BUND.

Court of Directors:

SIR MONTAGU CORNISH TURNER, *Chairman.*
SIR DUNCAN CARMICHAEL
THOMAS CUTHBERTSON, Esq.
SIR ALFRED DENT, K.C.M.G.
SIR WILLIAM HENRY NEVILLE GOSCHEN, K.B.E.
THE RIGHT HON. LORD GEORGE HAMILTON, G.C.S.I.
SIR JOHN NEWALL JORDAN, P.C., G.C.I.E., K.C.B., K.C.M.G.
WILLIAM FOOT MITCHELL, Esq.
JAMES MAXWELL GRANT PROPHIT, Esq.
LEWIS ALEXANDER WALLACE, Esq.

Chief Manager: W. E. PRESTON
Managers: J. S. BRUCE & G. MILLER

Bankers:

THE BANK OF ENGLAND.
THE LONDON JOINT CITY & MIDLAND BANK, LTD.
THE LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.
THE NATIONAL PROVINCIAL & UNION BANK OF ENGLAND, LTD.
THE NATIONAL BANK OF SCOTLAND, LTD.

Agencies and Branches:

Alor Star (Kedah), Amritsar, Bangkok, Batavia, Bombay, Calcutta, Canton, Cawnpore, Cebu, Colombo, Delhi, Haiphong, Hankow, Hongkong, Iloilo, Ipoh, Karachi, Klang, Kobe, Kuala-Lumpur (F.M.S.), Madras, Manila, Medan, New York, Peking, Penang, Puket, Rangoon, Saigon, Seremban, Shanghai, Singapore, Sourabaya, Taiping (F.M.S.), Tavoy, L. Burma, Tientsin, Yokohama

Drafts granted on the above Agencies and also on the principal Commercial Cities throughout the world. Bills of Exchange bought and received for collection. Travellers' Letters of Credit issued and every description of Banking and Exchange business undertaken.

R. W. ROBERTSON,
Manager.

ATTWATER & SONS

CANADIAN AND INDIAN MICA—

CUT, SLAB, and SPLITTINGS (Minimum Stock 200,000 lbs.) DYNAMO TAPES, ASBESTOS TAPES, and HOLLOW BRAIDS. EMPIRE CLOTH and LINO TAPES. PURE COTTON DUCKS and DRILLS. ARMATURE BINDING CORDS and ROPES VULCANISED FIBRE EBONITE, SHEET, RODS and TUBES.

PEERLESS LEATHEROID INSULATION
THE GREATEST INSULATING PAPER MADE

"RESISTIT" (SYN BAKELITE) PAPER, SHEET, & TUBE

PRESSPAHN AND INSULATING PAPERS

ELECTRICAL PURE RUBBER AND ADHESIVE TAPE

Contractors to the Admiralties and War Office. British, American, French and Italian Governments

Hopwood Street Mills, PRESTON, Eng. ESTABLISHED 1868
Telegrams: "Attwaters, Preston" *Telephone No.:* 1045 (2 lines) *Codes:* 5th Edition A.B.C., and Western Union

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVIII SHANGHAI, JULY, 1922 No. 7

New N. Y. K. Steamers

Keeping Ahead of the Procession

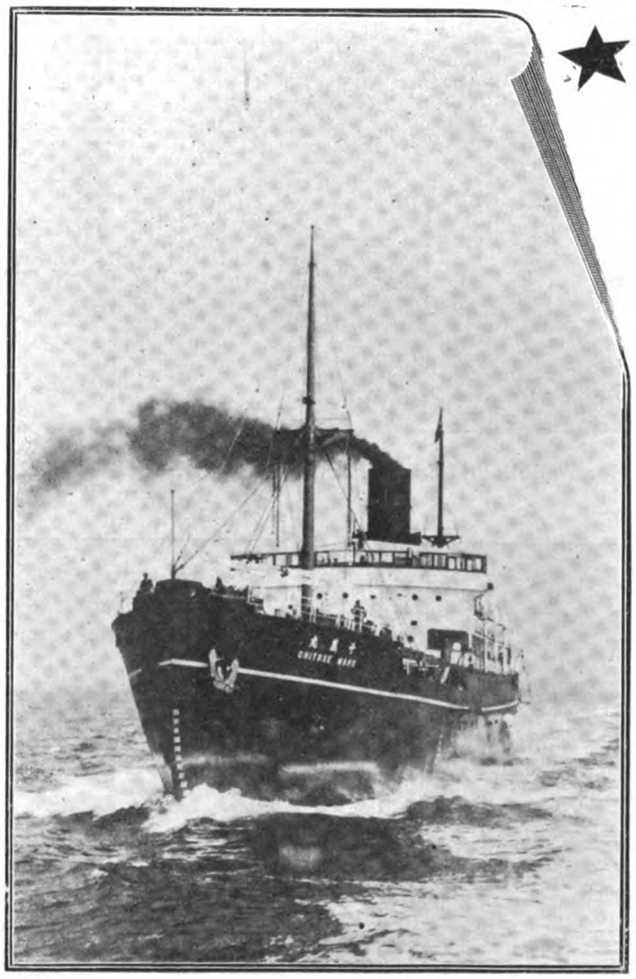
IN the keen competition for the first-class passenger traffic to and from the Orient, the Japanese do not intend to be outdone by their many rivals, and with each step forward on the part of other companies, the Nippon Yusen Kaisha keeps always abreast of the best, at times taking the lead in establishing standards for the well-being of its passengers which are most difficult for others to follow. While perhaps other companies may excel in the luxurious fittings and ornamentation of the saloons and staterooms of their crack steamships, the Japanese follow closely the artistic traditions of their own country. Cleanliness and comfort combined with the courtesy of attendance has won for their steamers a high place in the esteem of discriminating travelers.

Shanghai-Nagasaki Express Service

One of the greatest boons to the traveling public and general trade in the Far East will be the establishment of a rapid express service between China and Japan by frequent sailings of high-powered steamships specially constructed for the run between Shanghai and Nagasaki or Moji. The Japanese have long sensed the urgent necessity for such a service not only for the advancement of their own trade and mail facilities with China but for the general benefit of all residing and doing business in the Orient. To meet this demand the N.Y.K. is constructing two express steamers, the *Nagasaki Maru* and the *Shanghai Maru*. They are expected to be placed in operation some time this coming autumn and are now rapidly nearing completion in the Goven Yards of William Denny & Brothers, Ltd., of Dumbarton, Scotland. They will have a displacement of 6,150 tons (5,500 tons gross) with a length of 410-ft., width 54-ft., depth 32-ft., speed of 18½ knots and accommodation for 320 passengers.

Luxurious Accommodations

The steamers now employed on the Shanghai lines take about 48 hours for running the distance of 450 nautical miles between Moji and Shanghai, and about 36 hours between Nagasaki and Shanghai. The new steamers have been designed solely for the carriage of passengers, and will be completely equipped and furnished with the utmost regard for the safety and comfort of passengers during the voyage. The crossing will be made in about ten hours less than the time taken by other liners. In other words, if the steamer sails from Nagasaki at 10 a.m., it will reach Shanghai at about 1 p.m. the following day. Special consideration will also be given to scheduling the departures and arrivals of the steamers so as to facilitate connections with the railways in Japan and China. When these plans are put into effect, travelers between points in Japan and Shanghai, or *vice versâ*, can economize time to a considerable extent, with similar facility and advantage for passengers between Japan and interior points of China.



The "Chitose Maru"

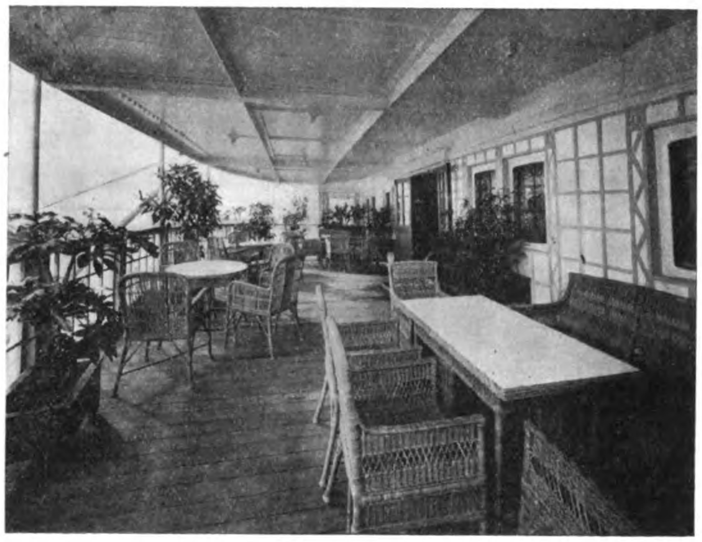
2,700 tons gross, speed 12 knots, 2,000 H.P. Built by the Yokohama Dockyard for the Hokkaido-Saghalien service of the N.Y.K.

The new steamers having been planned principally for the conveyance of passengers, the utmost attention and consideration is being given to their construction and furnishing, so as to ensure the maximum of safety, comfort and convenience. They will be equipped with magnificent social halls, dining saloons and smoking rooms, as well as inquiry offices, verandah cafés, bars and promenade spaces, with ample provision for the recreation and exercise of passengers. The steamers will carry only first and third-class passengers. The first-class cabin accommodation will consist of special staterooms, single, double and four berth cabins, etc., with different rates for each kind of room, thus offering a wide choice of accommodation to passengers. Now about the third-class accommodation. Heretofore accommodation for the third-class passengers on any steamer has been far from satisfactory. But the N.Y.K. took the initiative in improving it and has already effected considerable improvements on most of its steamers, thereby gaining the approbation of the traveling public. The improvements to be introduced in the new Shanghai liners are still more remarkable. Minute attention will be paid to the enlargement of space, efficient ventilation and lighting, complete sanitary arrangements of the rooms, etc. Independent dining, smoking and bar rooms of European style will be provided, in addition to a public

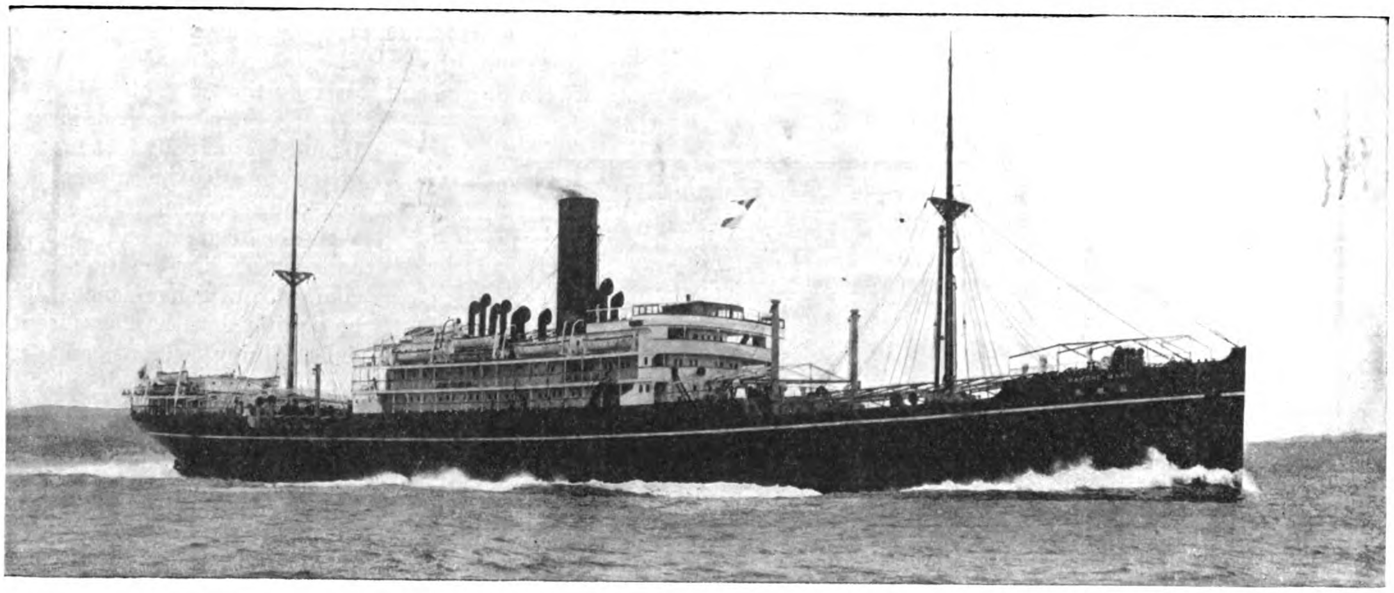
NEW N. Y. K. STEAMERS

VIEWS OF THE "HAKONE MARU" THE FIRST OF THREE NEW STEAMERS FOR THE EUROPEAN SERVICE

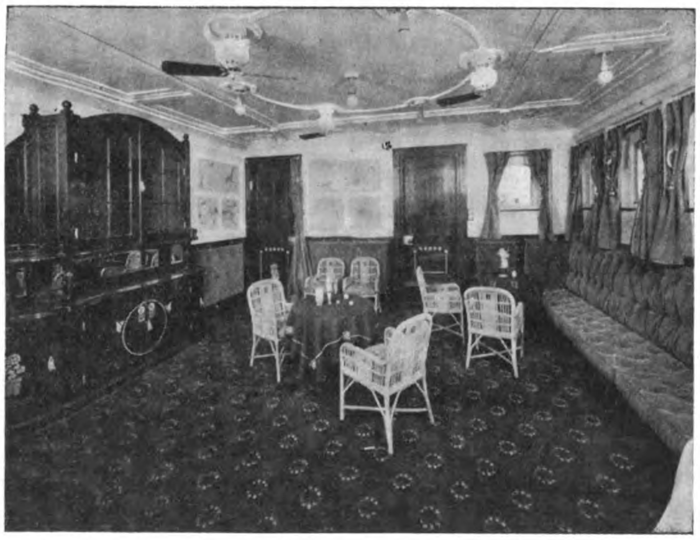
Dining Saloon



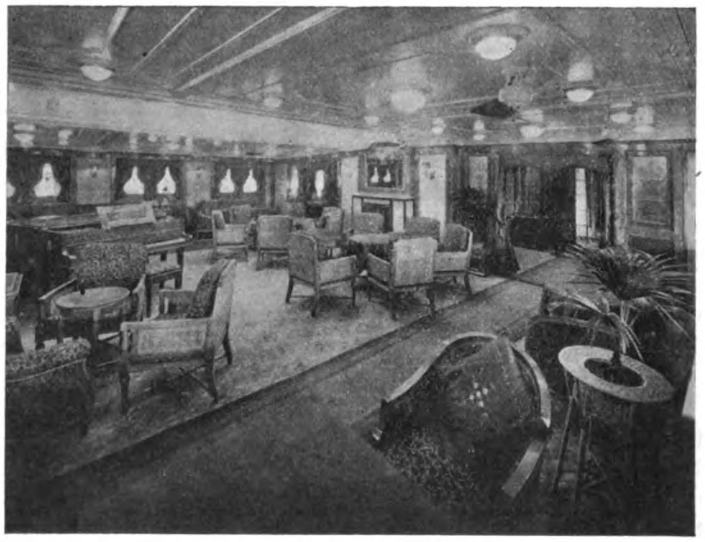
Verandah Cafe



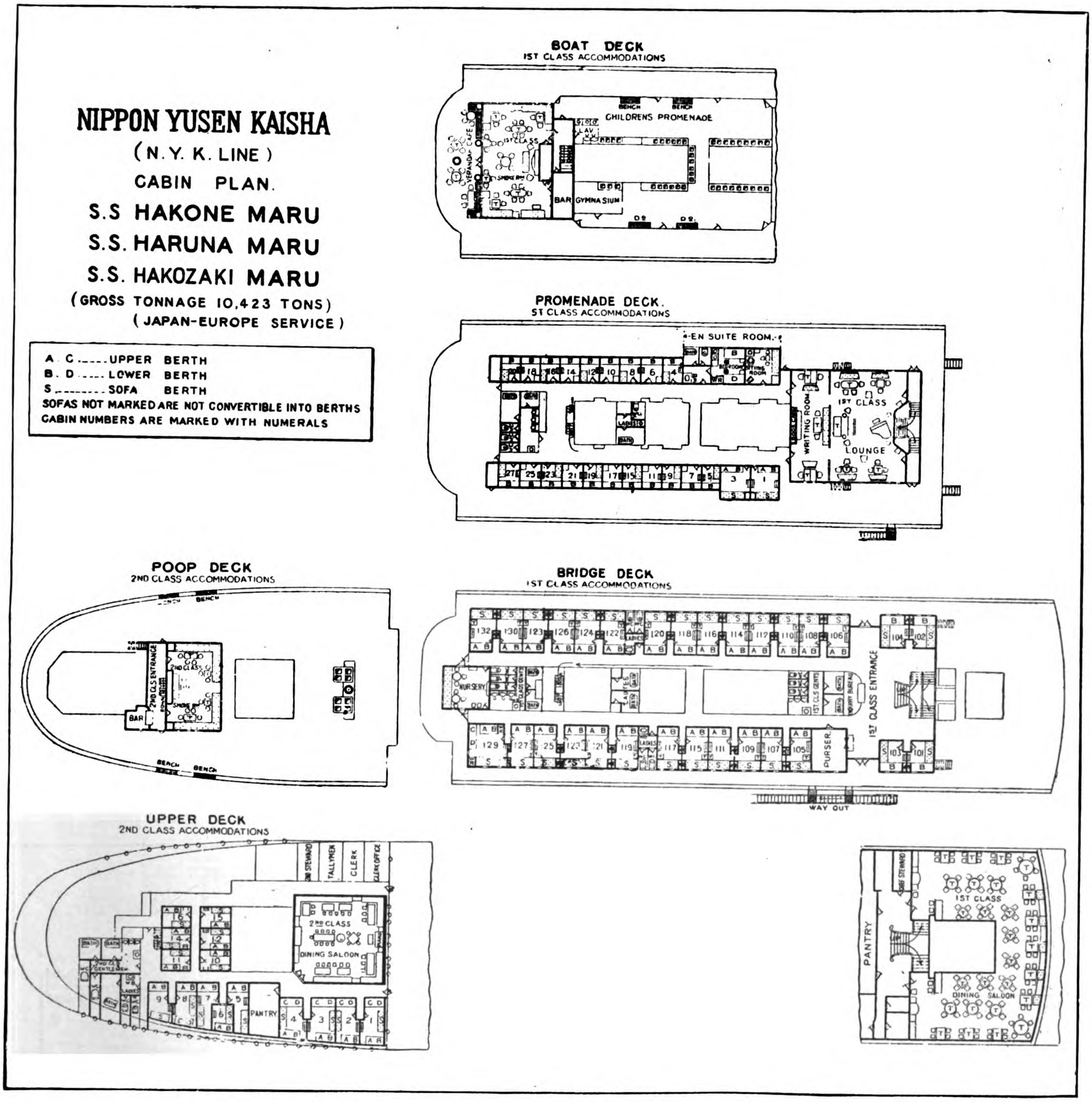
N. Y. K. Steamer "Hakone Maru," Built and Engined at the Nagasaki Works of the Mitsubishi Zosen Kaisha, Ltd.



Children's Nursery



Lounge



room with matted floor, supplied with chess boards and other means of amusement *à la Japonaise*. Needless to say, the lavatories and bath rooms are up-to-date and complete in equipment. In fine, the N.Y.K. confidently believe that the new fast steamers will give the traveling public entire satisfaction, and that the realization of the scheme will establish one more link to unite in friendly relations the countries of China and Japan.

New Hokkaido-Saghalien Steamer

Another of the forward steps taken by the N.Y.K. to facilitate Far Eastern travel has been the building of the *Chitose Maru* for the Hokkaido and Saghalien line. The placing of this steamer on the run in June last marked a new era in the opening up of these northern regions. Heretofore, steamers plying between the Hokkaido and Saghalien were all inferior vessels of under 1,000 tons. The new steamer was built by the Yokohama Dockyard to a special design which brings her for all practical purposes into the ice-breaker class. In size, she is the largest in the northern service, being 2,700 tons gross, 300-ft. long and 43-ft. beam, developing about 2,000 horsepower and a speed of 12 knots, with a big reserve of power. She has accommodations for more than 450 passengers and being specially designed for this service is provided with heating system, wireless apparatus, ice-breaking arrangement and all modern conveniences conducive to the safety and comfort of the passengers and crew and the efficient handling of cargo.

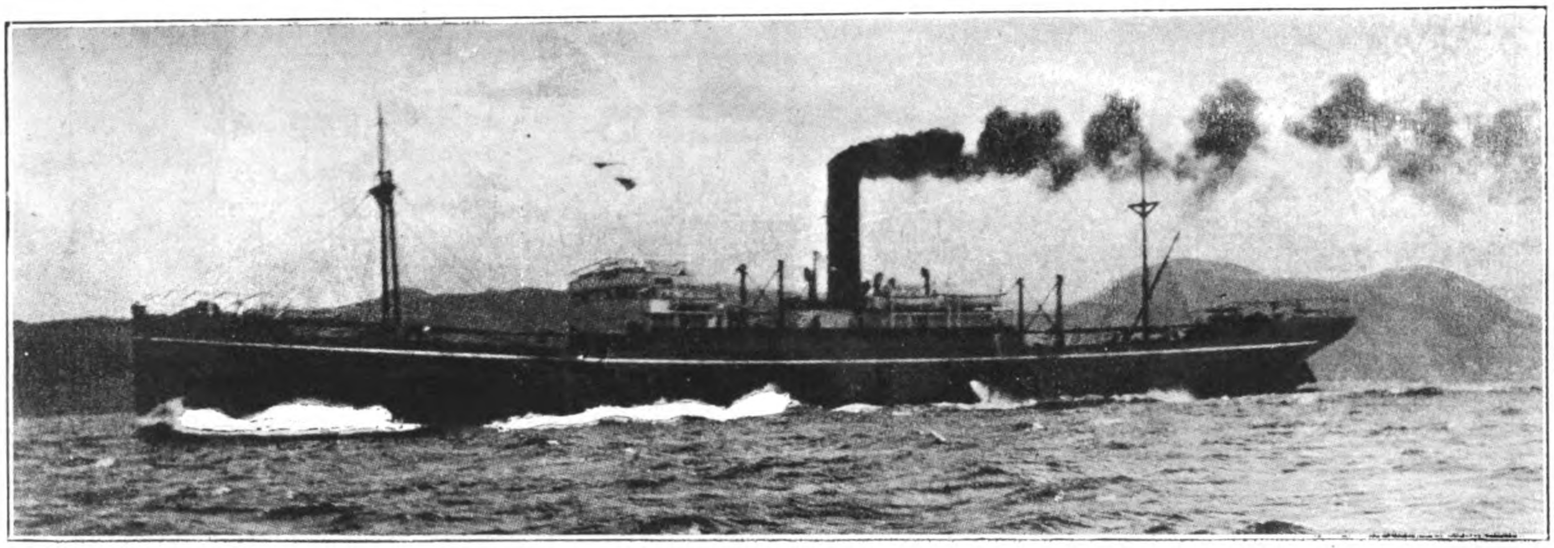
This comfortable steamer has naturally become the favorite for northern travel and shipments.

The engine room equipment of the *Chitose Maru* is as follows :

Main Engine—Single screw driven by a set of triple-expansion engines, cylinders, 23-in., 38-in., 64-in. dia. with common stroke of 48-in. Propeller of cast steel with four loose blades.

Boilers—200-lb. steam supplied from three 14-ft. dia. by 11-ft. 9½-in. long boilers. Parry's soot blowers are fitted to clean boiler tubes.

Engine Room Auxiliaries—Two Weir's main feed pumps ; one Weir's donkey feed pump ; one ballast pump ; one General service



The N.Y.K. T-class Geared Turbine Freighters "Toyooka Maru," "Toyama Maru" and "Toyohashi Maru," each of 10,000 tons Deadweight, specially designed for the European service. The first two ware built and engined by the Mitsubishi Dockyard and Engine Works at Nagasaki, and the last by the Kawasaki Dockyard Company at Kobe

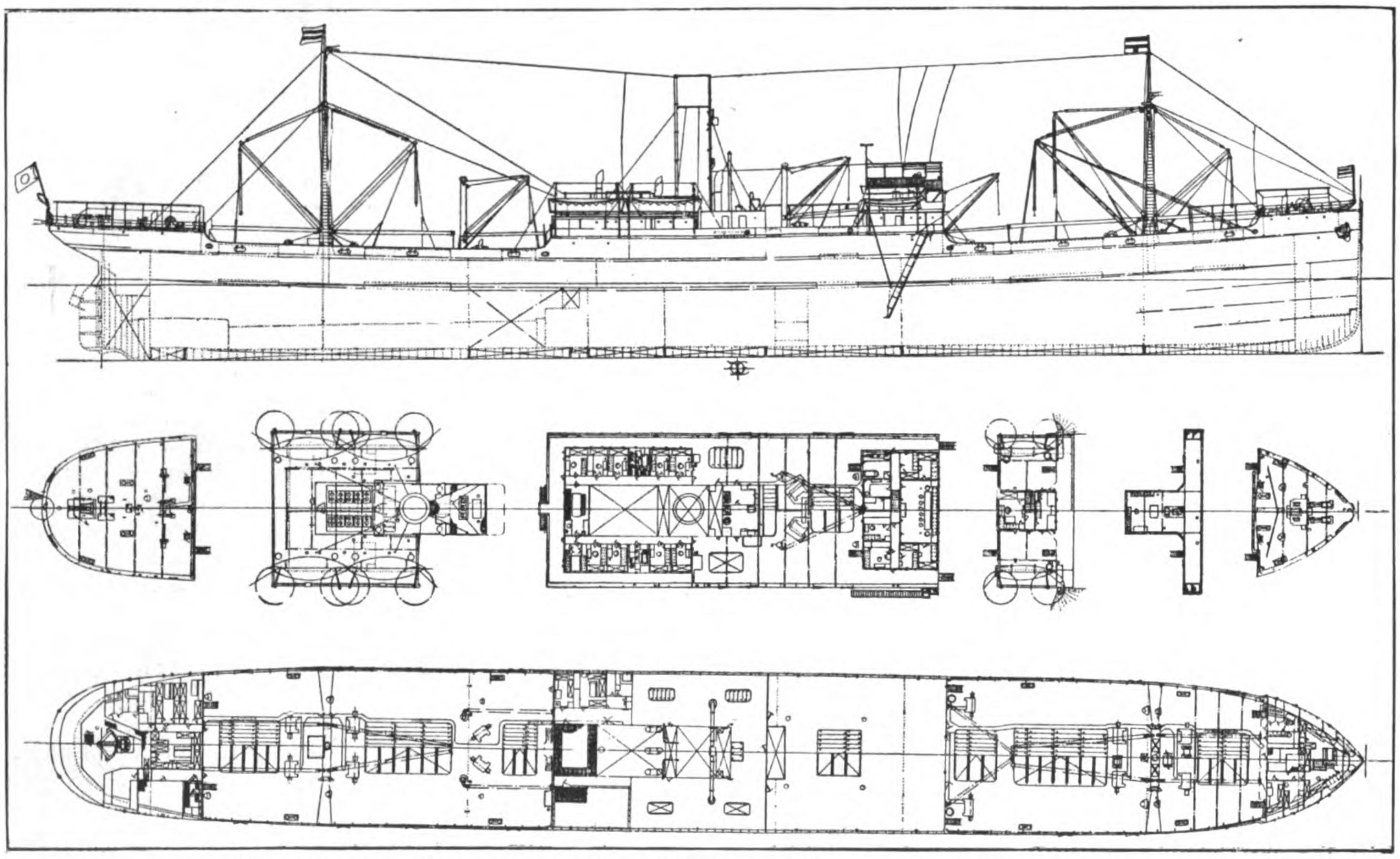
duplex pump; one centrifugal circulating pump; one forced draught fan engine; one 15 kw. dynamo engine; one Weir's feed water heater: one cascade feed water cleanser; one Prof. Shiba's patent auxiliary condenser.

Deck Machinery—One steam windlass; one steam steering engine; six horizontal steam winches.

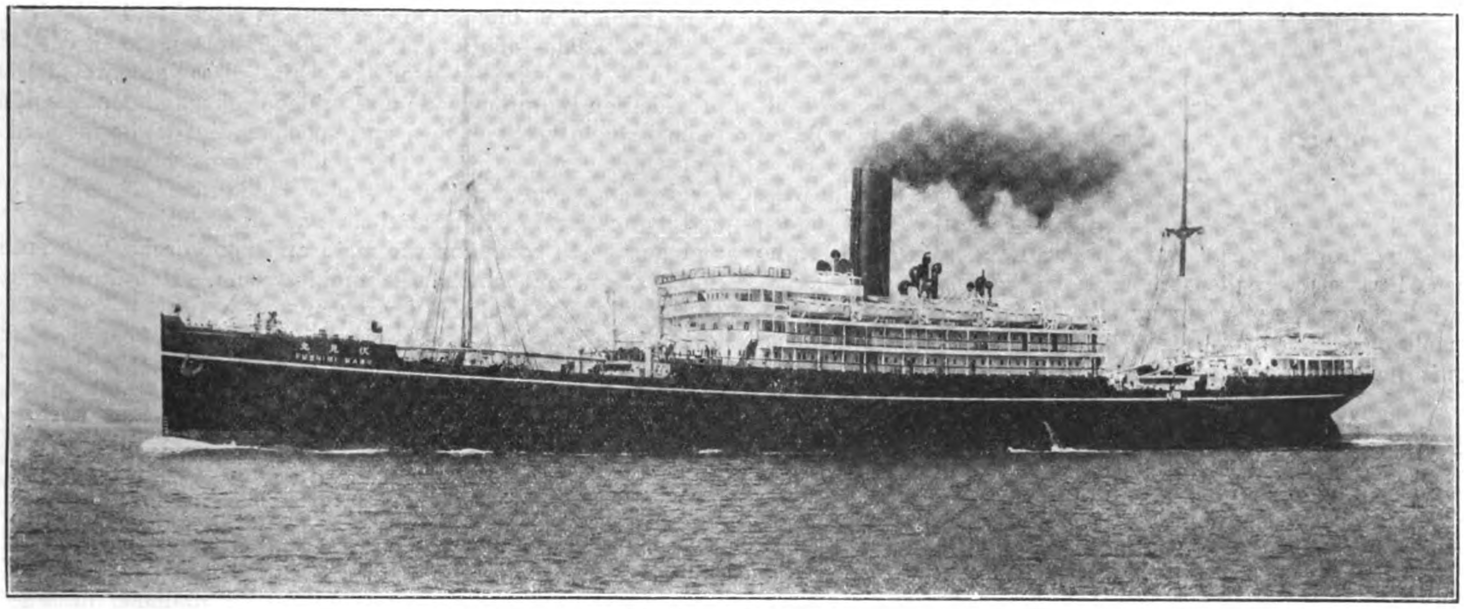
On the official sea trial she developed 4,000 I.H.P. at 93 r.p.m. and 15 knots speed.

European Service

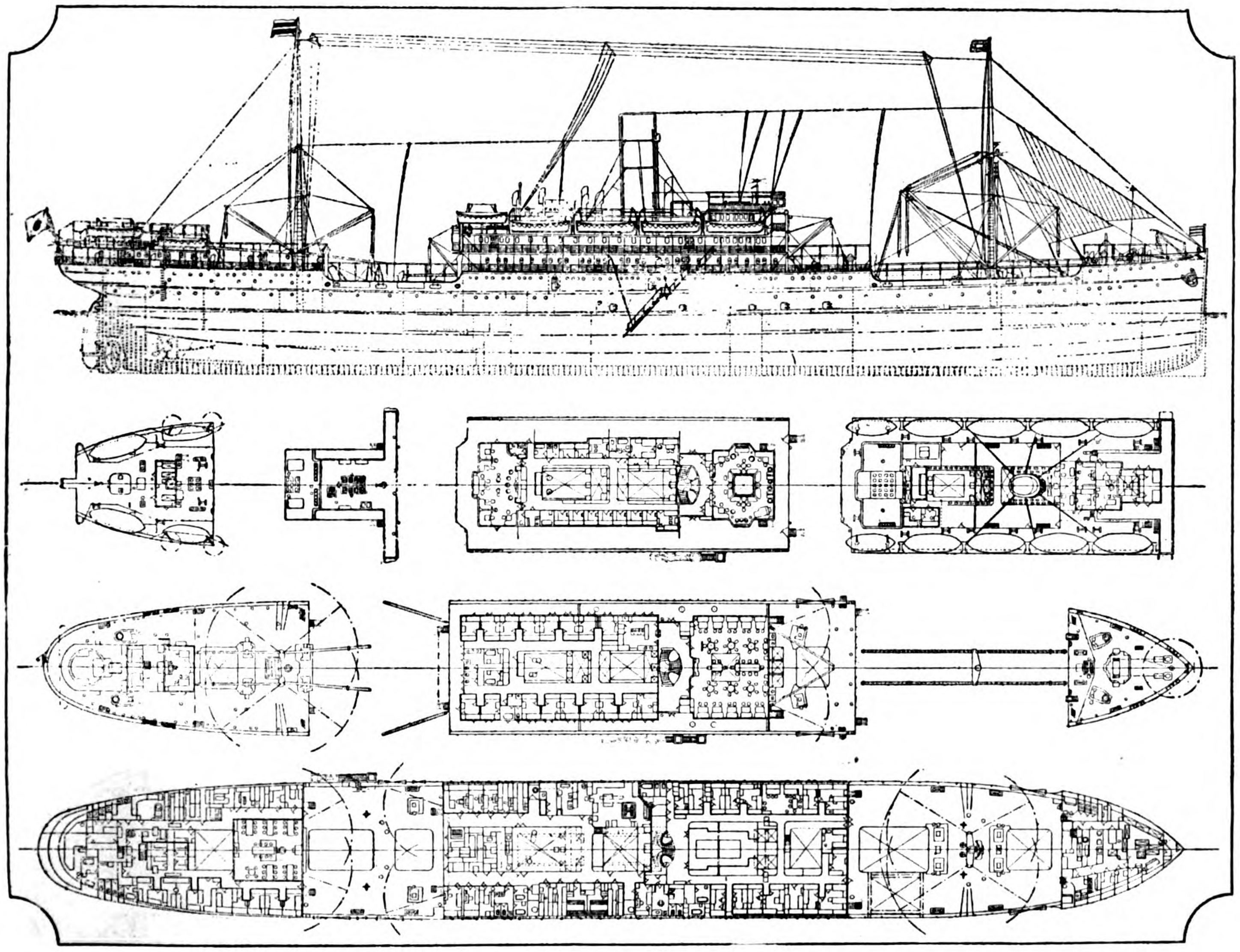
It is, however, in the new steamers for the European service that the N.Y.K. is demonstrating its efficiency. These steamers, the *Hirano Maru, Hakozaki Maru* and the *Haruna Maru* were built to replace the *Yasaka Maru, Miyazaki Maru* and the *Hirano Maru* lost during the war. The present tendency to forget events of only a few years back and criticize Japan ignores that in common with other Japanese companies, the N.Y.K. lost several steamers through enemy action, while running the gauntlet of the undersea terrors in the Mediterranean, Bay of Biscay and the Irish Channel, carrying food supplies and war materials to the allied armies. Critics overlook that the N.Y.K. carried its full share of the load imposed upon it and maintained a regular fortnightly European mail service during all the dark days of the war, and together with their escorts in the Japanese navy lived up to the highest traditions of those who instructed them in the art of modern seamanship. The spirit of the British navy and mercantile marine found its counterpart in the navy and mercantile marine of Japan. While the new European line steamships of the N.Y.K. cannot be compared to the larger ocean greyhounds in size, speed or luxury, past experience has taught that they are the most economical in the long 12,000-mile run from Japan to Europe loading at three ports and discharging



Plan of the N.Y.K. T-class 10,000-ton Geared Turbine Freighters built for the European Service



"Fushimi Maru"



"FUSHIMI MARU" CLASS OF N.Y.K. PASSENGER AND CARGO STEAMERS

Particulars: 505′-0″ × 63′-6″ × 37′-6″ moulded; two deck type; 2 Triple-expansion engines; 7 Boilers 15′-6″ × 11′-9″ × 200-lbs. pressure; Water ballast 2,275 tons; Cubic capacity 595,240 cft.; Total bunkers 2,200 tons; 12 Steam winches; Gross tonnage 11,900 tons; Deadweight 12,000 tons; Speed 16¼ knots

Passengers: 1st class, 121; 2nd class, 60; intermediate and 3rd class, 190

passengers and cargo in six or seven. Other points other than mere size had to be considered in the design of steamers on such a long and varied run. The European service of the N.Y.K. was opened in 1896 with a monthly service of cargo and passenger vessels, and then fortnightly as soon as new 6,000-ton vessels were built in England. In 1911, the original steamers were gradually replaced by six of the *Kamo Maru* class of 8,300 tons, and in 1913 these were superseded by five steamers of 10-12,000 tons. Besides the regular mail services the N.Y.K. has regular cargo services between the leading European ports and the Far East. During 1921 no less then 51 vessels were dispatched, an average of one a week.

In other words, the company is keeping abreast with the requirements of trade and the traveling public and its phenomenal success is due largely to the support of its friends in many lands.

The " Hakone Maru "

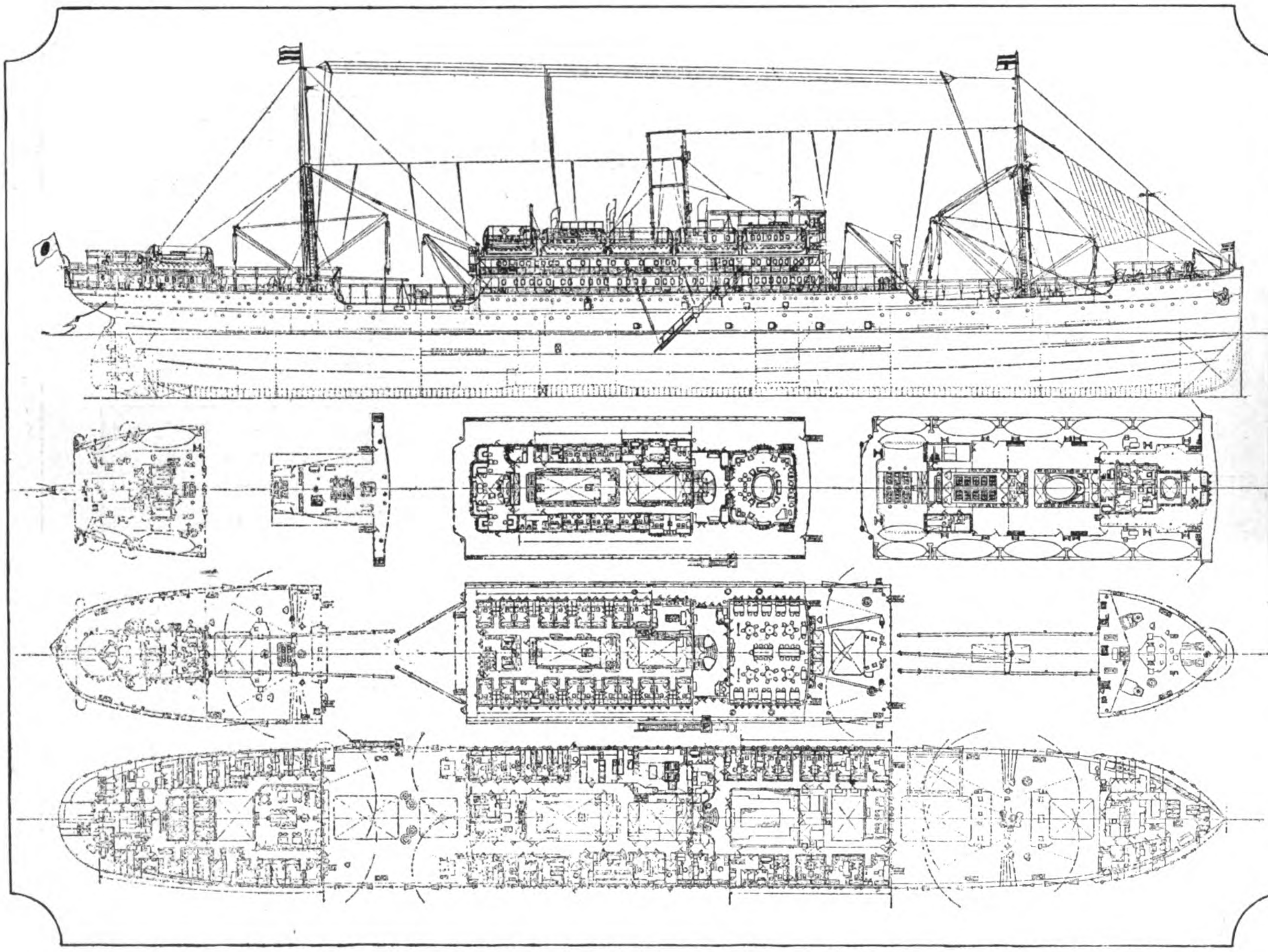
The three new vessels (of which the *Hakone Maru* was the first to be put on the run) have all been constructed at the Mitsubishi yards at Nagasaki to meet the requirements of the Japanese government and the highest class in Lloyd's register.

Launched on July 25 last, the dimensions of the *Hakone Maru* are: Gross tons, 10,422; dead weight, 10,861; displacement, 18,500; length, 495-ft.; breadth, 62-ft.; depth, 37-ft. The vessel has a double bottom throughout fitted for the carriage of oil in bulk, is divided into eight watertight compartments, is equipped with wireless, and the latest fire extinguishing apparatus and disinfecting appliances. The boat equipment is in excess of the board of trade requirements, all lifeboats being placed under davits.

Her accommodation is for 120 first-class, 56 second-class, and 180 third-class passengers. First-class accommodation is provided on the promenade and bridge decks, and consists of suite rooms, single berth cabins, and spacious and well-appointed two and three-berth cabins. The public rooms include social hall (or drawing room), smoking room, verandah café, children's room, and gymnasium. The second-class accommodation consists of two and four-berth rooms on the main and poop decks, with spacious dining saloon and comfortable smoking room. Hair-dressing saloon and laundry are available for passengers.

All the latest devices for the rapid handling of cargo are fitted, including 18 steel cargo derricks, one heavy derrick to lift forty tons, and 18 steam winches. The holds are spacious with extra large hatches, and have, as far as possible, been kept clear of obstruction to permit the loading of bulky cargo. A limited space is fitted with refrigerating machinery for the carriage of chilled or frozen produce. The propelling machinery consists of two sets of Parsons double reduction geared turbines constructed by the builders, steam being obtained from seven single-ended multitubular boilers, fitted with Howdens forced draught, designed to give a sea speed of 16 knots, which was exceeded on trials.

Whether forced by the competition of the larger and swifter U. S. shipping board and the new Canadian Pacific steamships on the transpacific run or merely as a return to pre-war conditions,



"KATORI MARU" CLASS OF N.Y.K. PASSENGER AND CARGO STEAMER

PARTICULARS: 490'-0 × 61'-0" × 36'-6" moulded; Combined reciprocating and turbine engines; 6 Boilers, 15'-6" × 11'-9" × 200-lbs. pressure; Water ballast 2,072 tons; Cubic capacity 595,240 cft.; Total bunkers 1,900 tons; 12 Winches; Gross tonnage 10,600 tons: Total Deadweight 10,900 tons; speed 16½ knots.

PASSENGERS: 1st class, 112; 2nd class, 56; European steerage, 178; 3rd and intermediate class, 8

the N.Y.K. have now concentrated all their crack passenger vessels on the European service. In addition to the three new boats above mentioned there are now on this run the *Fushimi Maru*, 10,928 gross tons, *Suwa Maru*, 10,672, *Kashima Maru*, 9,908, and the *Katori Maru* of 9,847 gross tons or seven 10,000-ton passenger steamers and four of the 8,000-ton class, viz., the *Atsuta*, *Kitano*, *Kamo* and the *Mishima Maru*, a total of eleven first-class mail and passenger steamers maintaining a regular fortnightly service between Yokohama, Marseilles, London, Antwerp by way of the usual intermediate ports.

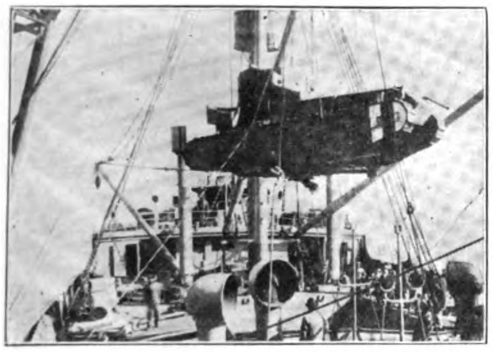
N.Y.K. Turbine Freighters

One of the features of the N.Y.K. European services is the special geared turbine cargo steamers of 10,000 tons deadweight capacity placed in operation soon after the outbreak of the war. Typical of this class are the *Toyooka Maru*, *Toyama Maru* and the *Toyohashi Maru* known as the T-class cargo steamers.

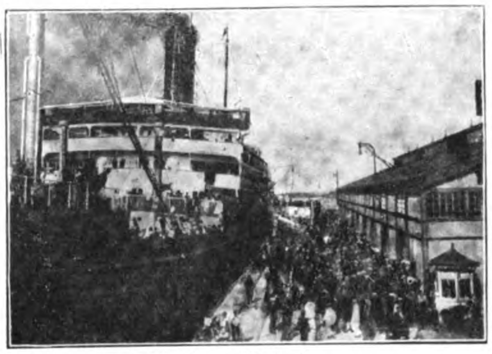
The first two boats have twin-screw geared turbines while the *Toyohashi Maru* has twin-screw triple-expansion engines with superheaters. The *Toyooka* and *Toyama Maru* were built and engined by the Mitsu Bishi Dockyard & Engineering Works, Nagasaki, and the *Toyohashi* by the Kawasaki Dockyard Company, Kobe. The *Toyooka* is of the following dimensions :—

The vessel, built to take the Teishinsho firstcl ass under the shipbuilding encouragement act and Lloyd's 100 A1 rating, is of full scantling type with erections, having a forecastle 34-ft., bridge 138-ft., and poop 35-ft. long. There are five holds with seven hatches, Nos. 2 and 5 holds having two hatches each. Fifteen steam winches made by the Mitsu Bishi Co., supply the cargo handling apparatus, together with 14 ordinary type derricks to lift 3, 6 and 10 tons, with a 30-ton heavy type of derrick at No. 2 hatch. The propelling machinery consists of two sets of Parsons' geared turbines to drive two lines of shafting. Each gear wheel is driven by a pair of turbines ; one, situated on the inboard side, is high-pressure, and the other on the outboard side is low-pressure. A reversing turbine is fitted in the exhaust casing of the low-pressure turbine. Each turbine shaft is connected to a driving pinion by means of a flexible coupling. The pinion is geared to a wheel, which is directly coupled with the propeller shaft. The gear ratio is 21 to 1. The turbines are of Parsons' improved type. The ahead turbine is of reaction and the astern turbine of impulse reaction type. They are designed for the working pressure of 200-lb., and for the maximum revolution of the main shaft at 120 r.p.m. The sizes are as follows :

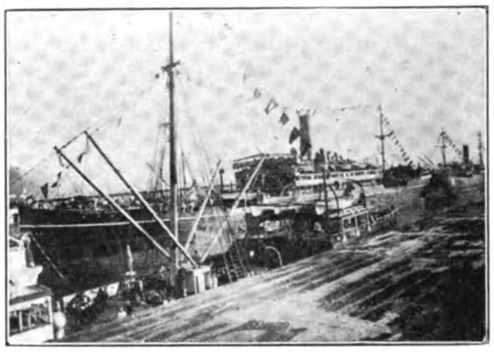
	H.P.	L.P.	Astern
Diam. and length	1-ft. 2½-in. x 4-ft. 10½-in. 1-ft. 11-in. x 2 ft. 5⅛-in.	2-ft. 6-in. x 3-ft. 4-in.	1-ft. 11-in. x 1-ft. 11¼-in.



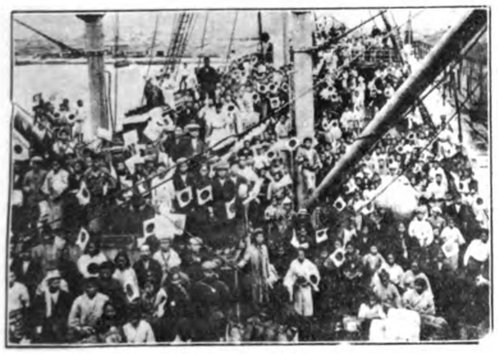
Landing a Tank



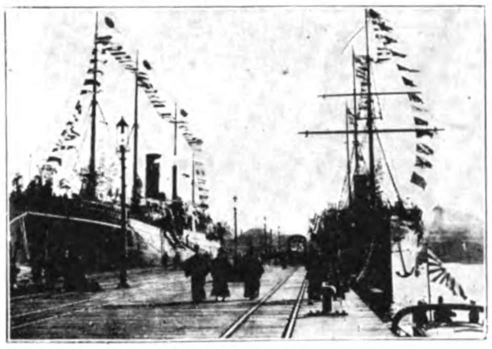
Dock at Yokohama



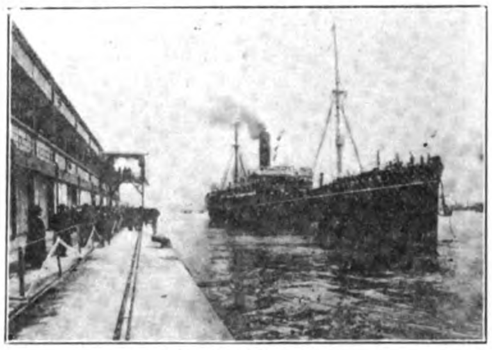
Great Northern Dock at Seattle



"Wakasa Maru"



"Tosa Maru"



"Tamba Maru"

Length o.a.	463-ft. 6-in.
,, b.p.	445-ft.
Breadth, moulded	58-ft.
Depth, moulded to upper deck	34-ft.
,, ,, to 2nd deck	23-ft. 9-in.
Maximum draft	26-ft. 8-in.
Gross tonnage	7,375 tons
Net tonnage	4,595 tons
Underdeck tonnage	6,574 tons
Deadweight carrying capacity	10,650 tons
Trial speed	14.54 knots at 9,650 tons displacement
Shaft horse-power	5,328
Height of 'tween deck	10-ft. 3-in.
,, ,, bridge ,,	8-ft.
,, ,, ,, (clear)	7-ft. 3-in.
Depth of hold (clear)	20-ft. 1-in.
Height of 'tween deck (clear)	9-ft. 6-in.

There are four single-ended Scotch boilers of 14-ft. 3-in. diam., 11-ft. 6-in. length, working at 200-lb., with Howden's forced draught. The oil pumps and oil-cooling pumps consist of three independent simplex pumps with complete oiling arrangements for turbines and gearings ; among them two are for ordinary working and one is for auxiliary purposes. There are two oil-cooling pumps of simplex-type. There are two main condensers and one auxiliary condenser of the non-vacuum type, having sufficient capacity to condense exhaust steam from windlass, winches and all auxiliary machinery. Other equipment includes two centrifugal pumps for circulating water, three feed pumps, feed water heater, cascade tank for feed water filtering, sanitary pumps, general service pump (duplex type), ballast pump (duplex type), two bilge pumps to each gear wheel casing, 40-ton Morrison evaporator, turning engine, turbine lifting gear complete, and two sets of kinetic air pumps, one of them being for reserve purpose. The dynamo of 15 kw. capacity is driven by a reciprocating engine. The propellers are four-bladed manganese bronze, of the built-up type, having a diameter of 14-ft. 3-in., and a pitch of 13-ft. 9-in.

The Central Workshops

Federated Malay States Railways

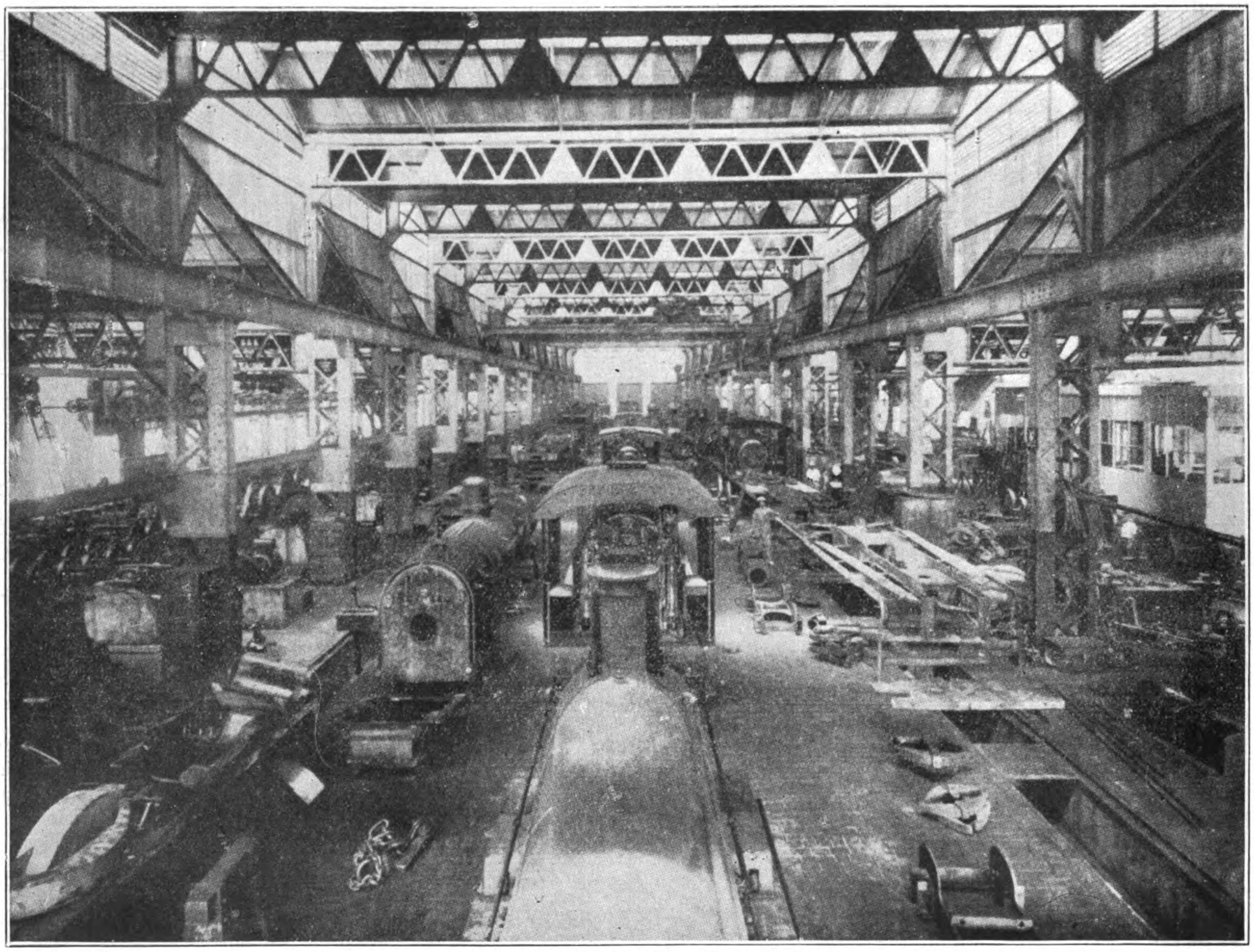
THOSE who have not actually paid a visit to the scene can have no idea to what extent the workshops connected with the F.M.S. railway system and situated just outside Kuala Lumpur, on the Batu Road, have developed within the past 17 years, despite the fact that a quarter of that period was occupied by such a crisis in the world as almost to cut the works off from the supply of material essential for upkeep and carrying on.

Prior to 1904 the site of the Central workshops was occupied by swamp, lallang and native quarters, and we well remember visiting the scene at about 6.30 one evening, at which late hour Chinese on contract were working trolleys on earthwork at a run. We, then, can fully appreciate the change which has come over the scene, for neither swamp nor lallang is particularly impressive. But now, in place of these, nothing is to be seen but a well-drained area containing a large array of vast buildings, an excellent residential quarter, and well-laid out recreation grounds. But perhaps a better idea of the rapid progress made may be gathered if we mention that in 1907 the actual shop area was 21,000 square yards, whereas in 1921 it has grown to 61,000. The area of the total workshop site and surroundings is 206 acres. Included in this area are a 9-hole golf course, a bowling green, and four tennis courts (three hard and one grass.)

The offices are contained in a well-built, roomy and airy block of buildings, which has had to be added to largely to keep pace with the increases necessitated by the growth of the works. The staff there numbers about 50.

Iron and Brass Foundry

The first shop we entered was the iron and brass foundry, where all castings for the railway are made. The whole of the work is carried out by a Chinese contractor, and we were greatly struck by the skill displayed in the preparation of the sand moulds and in the pouring of the molten metal into the imprints left by the removal of the wooden pattern. In the brass foundry we saw the application to brass castings of anti-friction metal, a practise universally adopted to obtain a smoother bearing surface for the axle boxes of rolling stock. In addition to their own work the railway department supply the public works department with



Erecting Shop, Central Workshops, F. M. S. Railways

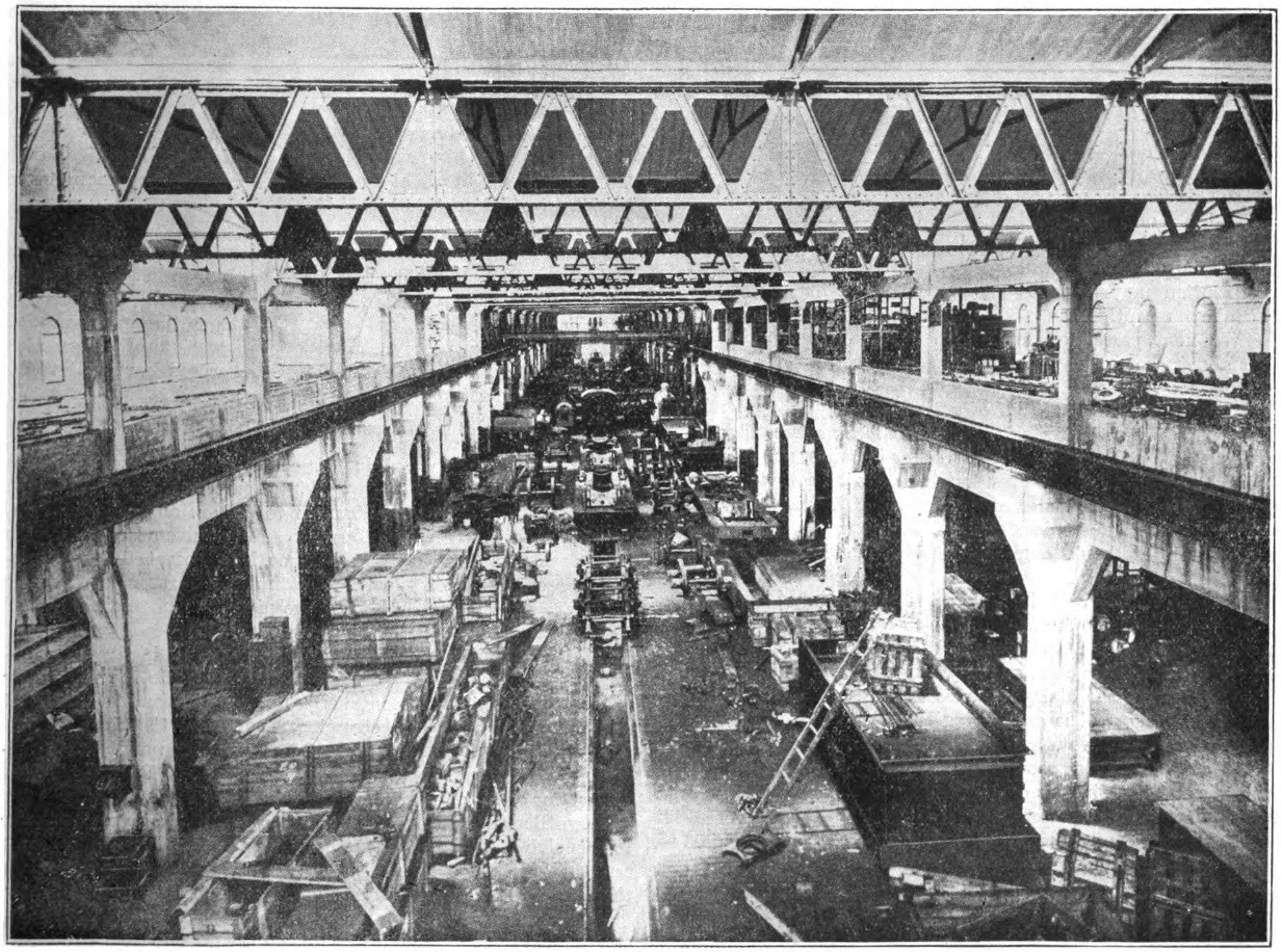
castings. In 1921 the output from the foundry was over 500 tons. Castings of five tons in weight can be made.

The adjoining pattern shop is also interesting, for there much care and skill are employed in making the patterns ; while in the upper region of this building is still preserved the old pattern used in casting the memorial tablet placed on the Victoria Bridge at Enggor when it was opened at the linking up of the old Perak and Selangor railway systems.

Passing on, we come to the electrical power-house where one-third of the power required in the work is generated, the remainder being obtained from the Ulu Gombak works. The fuel used in generating is the local Rawang coal, which, it is said, is excellent for the purpose. In this shed, which is kept in spotless order, power can be reduced from 5,000 volts to 400. A group of compressors close by saw previous service at the time of the construction of the Perak Pass tunnels. Not far from this building stands another one of very large size which is a branch of the stores department for the whole railway system. It is on this department that the works have to draw for supplies, these being indented for in bulk from the general stores of which Mr. Stones is in change.

We next come to a building which was used for building motor vehicles at the time when the railway department was running them ; but now it has been turned into a general utility shop. There; amongst other matters, lamp-making and repairing are carried on , and it is typical of the economical working so noticeable throughont the whole institution, that the old and familiar stand-by of the East, the kerosene-oil tin, is brought into service.

The next shop visited was originally intended for a waggon shop ; but it was never big enough for the purpose ; and now it is being used as a store for materials for the building of waggons, a large amount of which is awaiting use as soon as an improvement takes place in trade. Passing out of this building, we came to a broad open track which runs right through the works. In length it is 900 feet, and is known as the " traverser." There, a traveling table on rails is worked by overhead electric power. There are two sets of these rails, and the concrete bed in between forms the main drain and also a road which can be used by the fire-engine attached to the works. Adjoining this is the fine building used for the construction of the railway carriage bodies and concerning this we heard a good story about a past member of the railway staff, who, in his enthusiasm for horse-flesh, suggested that the building in question might be usefully employed as a hippodrome. Its length is about 400 feet. At one end is the saw mill, where we saw some very fine machinery employed in various way in cutting up and shaping the woodwork required.



Erecting Shop, Central Workshops, F. M. S. Railways

The railway department might almost be considered the pioneers in the use of Malayan timbers. A few years ago teak, chengal, rasak, merabau, meranti and serayah were alone in use but to-day, on the advice of the forest department, such comparatively unknown timbers as ballau, kapur, keruing, kulim, petaling are in addition being freely worked, and teak has been almost entirely eliminated.

In these construction sheds we saw the body being built of a tramcar which is to be run in Penang in connection with the Hill

Railway. We may here state, by the way, that the railway department does not make the under-frames of the carriages, but usually obtains them from home; though, during the war, in 1917-18 emergency orders had to be placed in Canada and Japan.

The next place visited was the boiler shop. This is devoted to repairs, which often are very heavy. Bridge and boiler construction work could be and has been, undertaken here; but, as the plates have to be obtained from home it has been found expedient to import boilers complete. The shed has just been extended 200 feet, and is now about 4000 feet in length. Near this, again, is a new waggon shop of 400 feet length. It was originally intended to make this 600 feet but it was found advisable to curtail the size for the time being. This shed, which is not quite finished, contains two bays, each 50 feet wide. Each bay will contain a 15-ton crane running up and down the entire length. The pillars have been constructed of reinforced concrete, as steel has been so high in cost and so difficult to procure.

Labor-saving Devices

Next we come to the blacksmith's shop covered by the roof of the old Kuala Lumpur railway station. Here are several steam hammers, one of the largest of which was built in the works.

In this department new springs for rolling stock are turned out and old ones are repaired, tested and brought into re-use. Here as elsewhere we saw a considerable amount of valuable and labor-saving machinery which we are not competent to describe, but mention may be made of two machines for making bolts which have recently been installed.

We next passed on to an other carriage shop. This was built about two years ago and is 660 feet in length, with two bays, each 50 feet wide and equipped with 15-ton cranes. This huge shed is devoted to the work of fitting and repairing carriages. Everywhere we went we found the work most interesting but it was especially so in this department. For instance, one of the first things brought to our notice were some carriages that are being fitted up for the paymaster of the railways. These are going to be formed into two trains, each of three carriages. These are regular miniature banks on wheels, designed for paying wages over the whole system with speed and safety. The applicant for pay receives it through a window protected by expanded metal; and as there are several of these windows to each carriage the process of paying out can be carried out rapidly in comfort and safety. Near by this, we came upon a new type of car which, we understand, was exhibited at the Malaya-Borneo exhibition at Singapore. It is an interesting vehicle embodying the very latest ideas of ease and comfort in railway traveling. To achieve this, the central idea is, of course, a bar compartment, where cold tiffins or tea can be obtained; in fact in this one carriage are combined all the comforts of the usual first class, together with facilities for the seating of four people in comfort at a table large enough for the playing of card games. This accommodation is provided both in that part of the car which contained the bar and also in what we may call the ordinary part. This has been found possible by building the sides of the carriage on a new principle, namely, what is described as bent sides, i.e., the sides, instead of being perpendicular, bulge outwards. Similar coaches are now running to Malacca and on the Singapore section. Fans are provided throughout these cars.

In reply to a question we were informed that carriages required to be renovated and re-varnished in from 18 months to 2 years' time.

Innovations on Trains

Other matters of interest that we saw were the following. A cupboard with doors opening outwards was fitted in the side of a guards van. This is for the use of the carriage-examiner, who when he needs grease, will now be able to obtain it without plastering the said material over the floor of the van, or, possibly, over luggage. We next saw a room where the electric fittings of the carriages are regraded and in which materials for electric lighting are kept. We were told that some six to eight stations had been fitted up by the department with small lighting sets, though whether with entire success it is too early yet to say. Passing on, we came to a room devoted to upholstering work for the carriages, and there among other things we saw some ratan seats for the second class which, we were told, were made in England. Needless to say, the management has long since started to make ratan seating in the workshops.

Across the railway line is the engineering depot, which is under the charge of the engineer for ways and works, Mr. R. W. Haim. This, owing to pressure of time, we were unable to visit; but on our way back we passed through the erecting shop, a building now 600 feet long, and containing three bays, the central one being 45 feet wide, and those at the sides, 40 feet. Two 20-ton cranes are in operation here, while an electrical shop is installed upstairs. Though several times extended, this shed, we were told, is still too small, and the question of building a new shed on a new plan is under consideration. The machinery in this section is very fine, especially the numerous lathes. Among the many items of interest is a hydraulic press with a pressure of 200 tons. By means of this, wheels are put on the axles at about 70 tons pressure. The system of group driving by means of electric motors is adopted in this shed, but the bigger machines are individually driven. Turret lathes—so much in use at home during the war—are among those installed in this department.

In reply to a question as to whether the workshops turned out any work for war purposes we were informed that our authorities had offered to make huts which could be shipped in sections ready for speedy erection but the offer had been declined. This seems a pity for we could have turned out this, at one time much needed work, rapidly and cheaply. Munition work was out of the question here owing to the fact that the material would have had to be brought in and shipping was scarce.

Staff and Hours

The staff employed in this great undertaking varies from 1,300 to 1,400 all told. The working hours for the laborers are: 6.30 a.m. to 11 a.m.; 12.30 noon to 4 p.m. on ordinary days, on Saturdays 6.30 a.m. to 12 noon. Pay is given for 8 hours on Saturdays when the workman has not been absent during the remainder of the week. Instruments known as recorders showing the time of the arrival and departure of the workmen are installed in the works.

Before leaving, we went to seen the railway institute a commodious building of nice design erected alongside the recreation ground. This building contains a fine reading and refreshment room, a billiard room, a changing room, with the usual conveniences, a secretary's room and a store room. In addition to billiards, a ping pong table is provided. The Padang is big enough for cricket, football or hockey while two grass tennis courts and two Badminton courts are also maintained. The subscription to this club is a graduated one based on salary, and both the club and the adjoining playing field are deservedly popular, adding as they do to the pleasure and convenience of those who live near by.

To accommodate the senior staff, some 18 to 20 bungalows of good design have been built in a line on the far side from the works of the golf links, care having been taken to provide ample space in between. In fact it is very evident that in laying the site of what is now a little township, the greatest care has been taken to provide in every possible way for the welfare of the whole staff whether in the works or during their leisure hours.

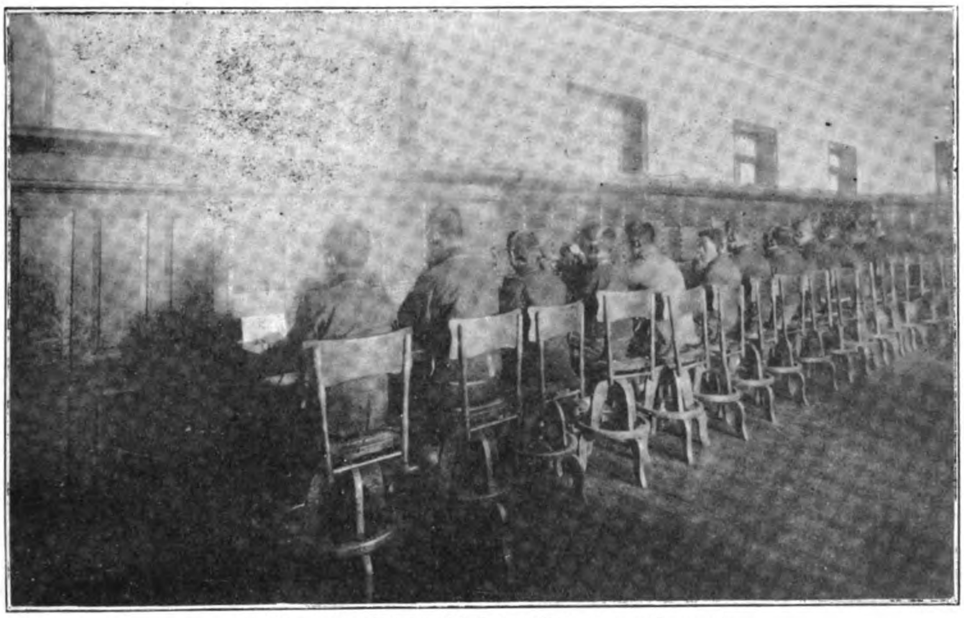
In conclusion, we can only advise our readers to pay these great works and model township a visit, for we are unable in the course of an article to do them justice. For the rapid strides made and the success achieved, the greatest credit is due to Mr. P. A. Anthony, C.M.G., the general manager of our railways during the past 12 years, and to Mr. G. C. Forbes, the locomotive superintendent, who has charge of all the main portion of the undertaking, and who, coming to the F.M.S. in 1903 after 5½ years' railway service in India, started these works and developed them into what they are to-day—a monument of energy and enterprise under careful supervision and economical working.—*The Malay Weekly Mail.*

New Telephone System for Mukden

ONE of the largest Kellogg system-exchanges in the Far East is that of the Manchurian provincial government at Mukden. The first telephone exchange in Mukden, a local battery magneto system, was installed about 1910 with less than 200 subscribers; by 1918 this exchange had grown to its ultimate capacity, 800 stations. The equipment was in poor condition and the administration found it impossible to furnish satisfactory service.

In order to improve the service and, at the same time, to make possible further extensions to take care of over 100 merchants who were clamoring for telephones, the director of the administration requested several manufacturers to submit specifications and samples of their apparatus.

The Kellogg universal switchboard was selected as best meeting the requirements, and an order was placed with the Kellogg Switchboard & Supply Company, through their China Agents, Messrs. Andersen, Meyer & Company, for central office equipment having initial equipment for 2,200 lines, and an ultimate capacity for 3,200 lines.


Operating Room, Mukden Telephone Central

It is possible to operate either magneto local battery, or common battery telephones in connection with the Kellogg universal switchboard. The Kellogg universal line circuit consists of a standard common battery lamp signal line circuit with the addition of an extra contact at the line relay. In order to change a line from magneto to common battery, it is only necessary to change one connection on the relay terminal. The changed circuit is then a standard common battery line circuit exactly the same as would be furnished in a straight common battery switchboard equipment. The connecting cord circuits automatically adapt themselves for connections from magneto to magneto; magneto to common battery; and common battery to common battery lines.

The new Mukden exchange was placed in service during the summer of 1920. The 800 magneto local battery subscribers were connected with their old telephone sets to the new Kellogg universal switchboard. No change in the instruments was necessary.

At the time the new switchboard was placed in service, the administration announced that Kellogg common battery telephones would be installed for any subscribers who desired common battery service, upon the payment of a deposit, and at a small increase in the monthly rental. Immediately applications began pouring in for the Kellogg telephones, and within one year, the original 800 stations were changed to common battery, and 400 new subscribers were added to the exchange, making a total of 1,200 stations. By this time the line cables were filled to capacity. The administration recently placed orders for wire, cable and telephones, sufficient to take care of 500 additional subscribers.

The telephone administration erected a modern fire-proof one storey and basement building to house the central office equipment. All of the apparatus was installed on the ground floor. The terminals, relay racks, wire chief's desk, charging and ringing motor-generators, power panel, etc., are all in one room—conveniently arranged for maximum efficiency. The universal switchboard and chief operator's desk is in a large room on the same floor. Two sets of storage batteries are located in a dry and well-ventilated basement room. A gas-engine generator charging set is located in a basement room. This is furnished as an insurance factor against possible failure of the city power plant which regularly supplies current for operating the charging and ringing generator.

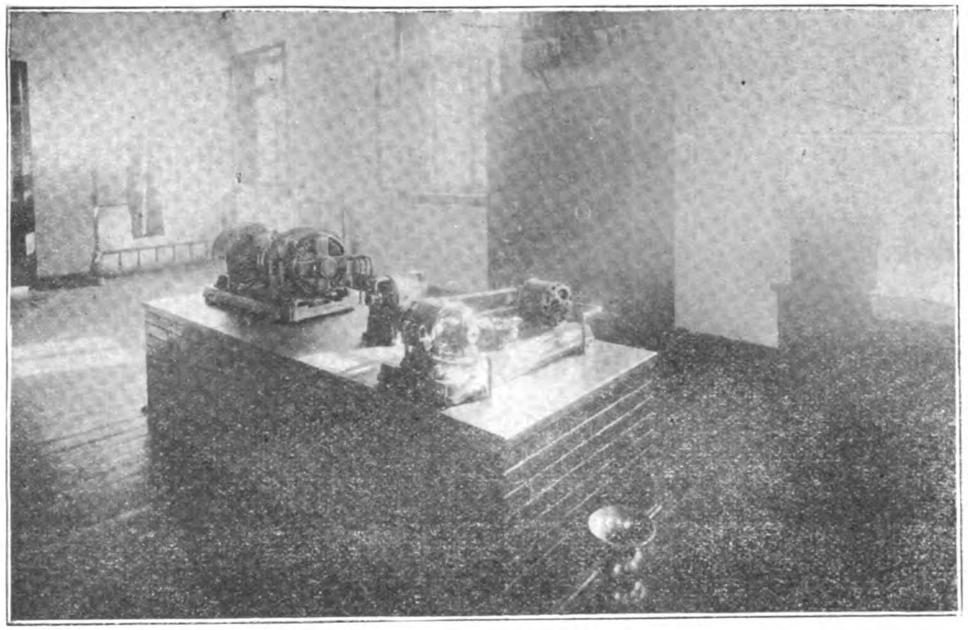
The line cables enter the office through a tunnel which connects the basement to a terminal house near the cable pole. All of the work of installing the equipment was performed by Chinese "Fitters" regularly employed by the administration. A glance at the accompanying illustrations is proof that they did their work well. The exchange has now been in service 18 months, in charge of the same Chinese foreman who operated the old magneto equipment. This man is not an engineer, and had no previous experience with common battery equipment. The Mukden telephone service is highly satisfactory to the subscribers, and one does not hear in Mukden the complaints that are voiced elsewhere in China.

GAS AND STEEL WORKS AT TSURUMI.—A gas plant and steel works will be started at Tsurumi soon, with a large daily output of steel and a daily capacity of 2,000,000 cubic feet of gas, according to the Japanese vernacular press. Mr. S. Asano, president of the Toyo Kisen Kaisha, has bought out the coke factory of Mr. T. Yamamoto, ship magnate of Kobe, and machinery for the new factory has already been contracted for.

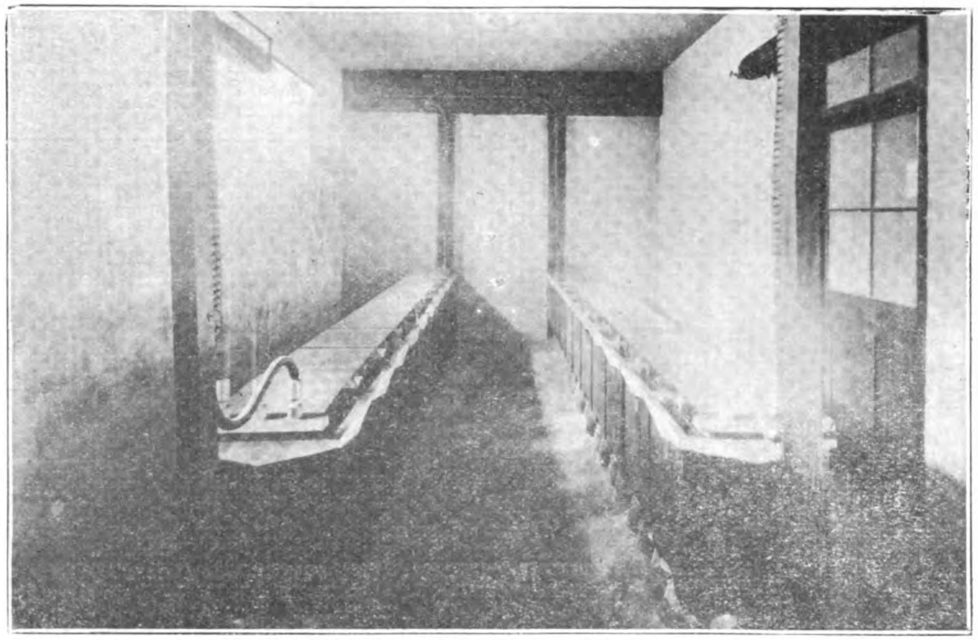
This factory will be one of the first of its kind in Japan where the manufacture of steel and gas will be combined. It is intimated that a contract has been made with a gas company in Tokyo to furnish illuminating gas from the Asano works.

SOUTH MANCHURIA SPINNING MILL, LTD.—Architects entrusted with the drawing up of a plan for the new spinning mill to be erected by the South Manchuria Spinning Mill, Ltd., have arrived at Fengtien (Mukden) from Japan. This Company has secured from the S.M.R. Co. the lease of a tract of land comprising about 15,000 *tsubo* on the west side of the railway track at Mukden, and proposes to begin building work in early July at the latest, to be finished by the end of October. The total cost is put at about Y.300,000. The new plant is expected to be opened to operation about May next year.

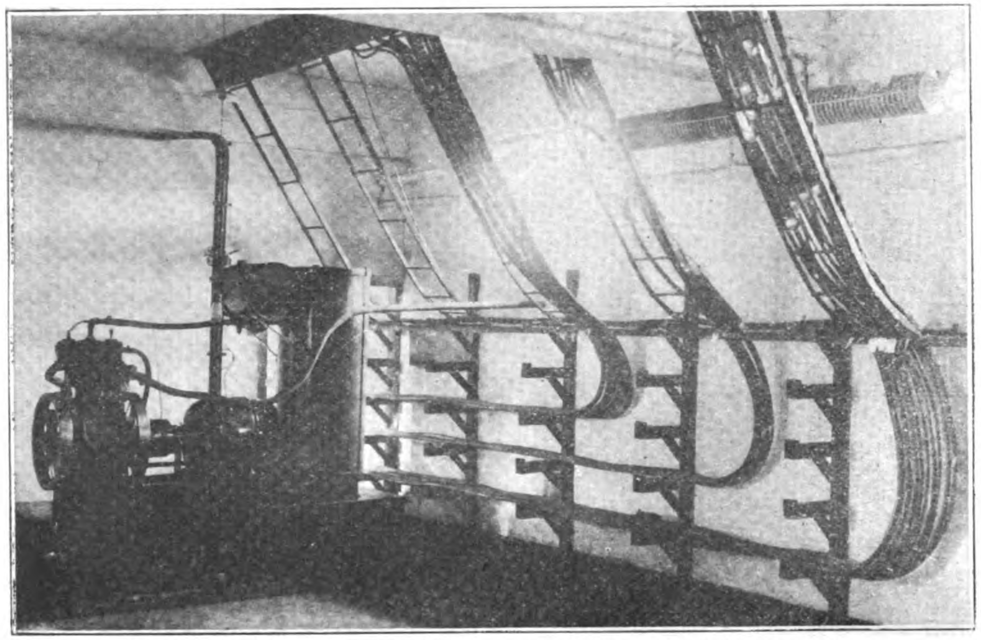
NEW KELLOGG UNIVERSAL SWITCHBOARD, 3,200 LINE INSTALLATION FOR THE MUKDEN TELEPHONE ADMINISTRATION



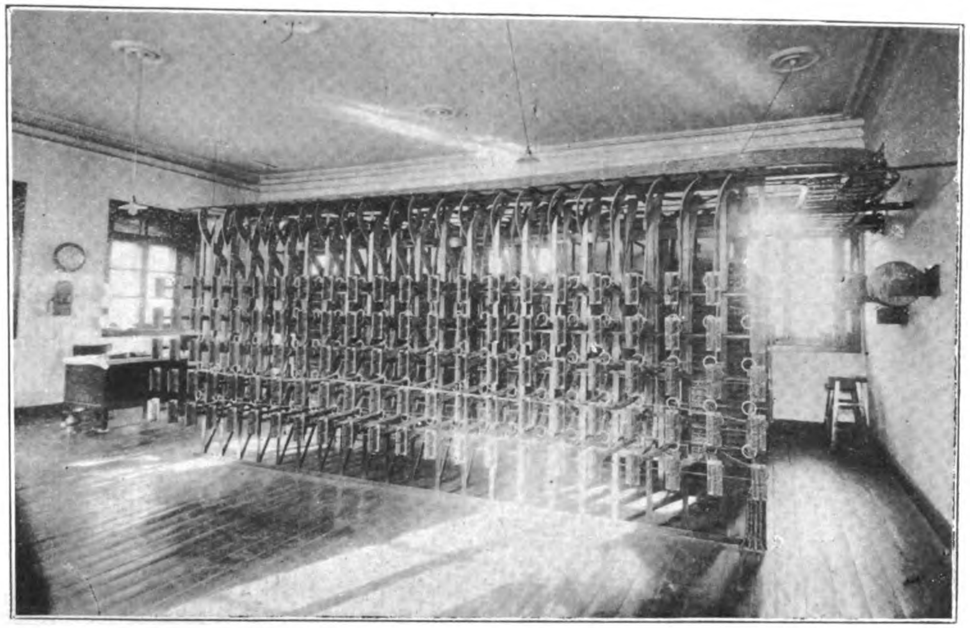
Power Apparatus and Wire Chief's Desk



Battery Room



Gas Engine Generator, Line Cables Enter Building through Basement



Kellogg—Terminal Room: 3,200 Line Equipment

Tayeh and Its Industries

China's Half-way Policy

THE Chinese have a saying "*pan tu erh fei*" which means "to go half the way and then fail to go further." Failing half-way is a common kind of failure in China. "This man began to build and was not able to finish" was said 1,900 years ago and is as true as ever, especially in this land. In this Tayeh region we seem to be accorded more than our share of this kind of thing. There is a place about 15 miles from here called Wangshanshih (facing mountain stone). It was prospected by no less than three engineers from Glasgow. A million dollars were spent by Chang Chih-tung over these preliminaries.

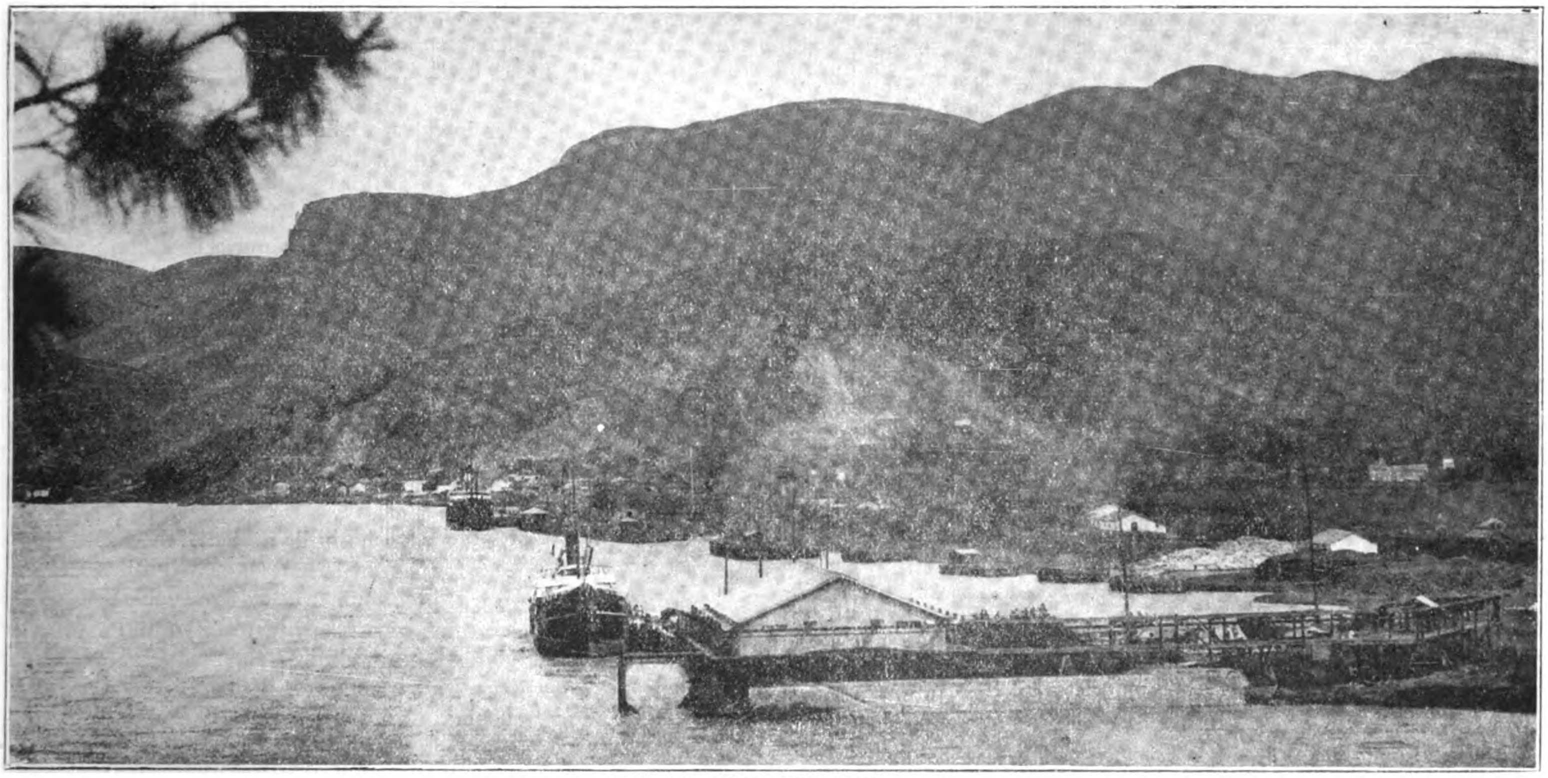
A little mining was done and the prospect was a fair one but somehow or other the enterprising spirit exhausted itself at that point and the scheme was abandoned. There is now only a big hole to show for the expense. There is a mountain about seven miles from here to which a light railway was constructed and mining begun. They say that mountain contains the "Wu Pao" (five precious metals), viz., gold, silver, copper, tin and lead.

About three years ago the mining ceased. The railway track still remained; we used often to walk along it. Pedestrians in abundance go along there. One would have thought it would pay to run trains for them and their loads. But no such idea seems to be in anyone's mind. Now within the last three months the rails have been taken up—transported, we are told, to Elephant's Nose mountain, the latest enterprise of the Hupeh government.

On my last journey I had some more instances of this kind of ineptitude. In the Hsingkuo (now called Yanghsien) county there is another light railway with no traffic on it. It was to convey copper-ore to the river side whence it could be transhipped to Futzukou where there is a copper foundry. I saw this place too. A few men are in charge of it but the Japanese manager was dismissed two years ago and there is now nothing doing.

I took a small steamer from there to Shihkweiyao. This we are given to understand is to be a port of considerable importance. It has been the river side terminal for 30 years for the railway to the iron mountain. There is always a Japanese steamer moored here ready to take iron-ore to Japan (or to a dump at Wuhu when the river is too low for big steamers). Japan gets this iron on special terms in payment of the Boxer indemnity. Other steamers tow lighters of ore up to the Hanyang Ironworks.

A few years ago a great enterprise was started just below Shihkweiyao. A huge plant has been collected and blast furnaces are to be opened there to relieve the pressure on Hanyang. The dates that I have heard given for opening the new furnaces are more numerous than I can remember. It is always a few months later. Meanwhile there is a model town with wide streets and rows of well-built houses of three qualities according to the grade of occupier. A bund has been made for some distance and is to be extended. A fine club house exists and is well patronised. Electric light is supplied to every house and water too.

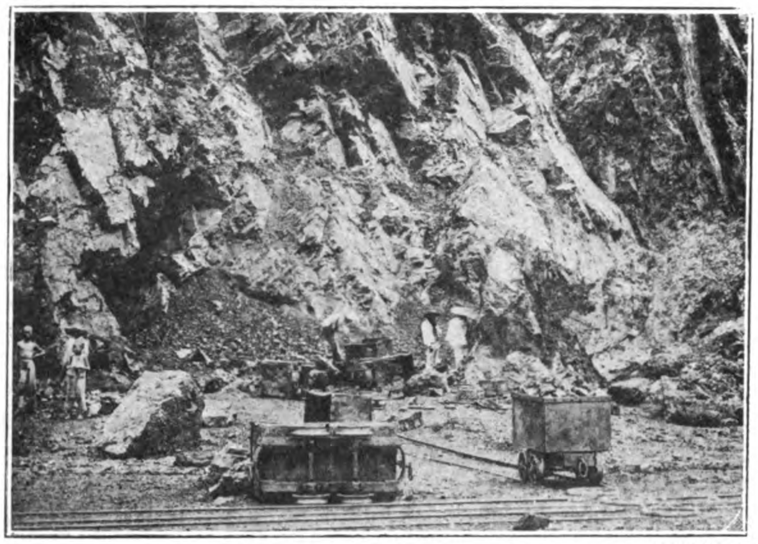


TAYEH HARBOR

But the enterprise is halting. Not only has the first blast furnace still to be opened, which means that nothing has yet been produced to pay the promoters, but we hear of economies being effected in various ways. One of the two big mines is now closed and the trains run now to the other and newer one. The fine hospital which—quite rightly—was got ready in case of accidents had two foreign trained doctors. It now has only one. It looks as if the opening of those furnaces, in spite of a very large stock of coke which has been accumulated, is still a good while off.

A Line that Tells a Tale

Two or three years ago the Hupeh government opened a mine at Hsiangpishan (elephant's nose mountain). The railway runs alongside of the aforesaid Hanyehping line—sometimes 5 *li* apart,



TAYEH IRON MINES

sometimes almost touching. Yet they never quite touch. There could be no transfer of rolling stock from the one to the other. The construction of the line was a marvel of speed—only six months, I am told. The chief engineer was a Chinese educated in the U.S.A. He is now in Wuchang to answer a serious charge and the man below him has got his place. It sounds like a very old tale and no doubt went a long way towards making this undertaking, like the others, a non-paying concern. The terminus of this railway is nearer to Hwangshihkang than to Shihkweiyao.

Hwangshihkang has grown of late. A fine chamber of commerce fronts the river and near to it a new R. C. hospital. What no European can understand is why no decent road has yet been made connecting these two towns. They are only 10 *li* apart; yet there is only a footpath, winding and muddy, to bear the enormous traffic that passes along it on fine days. On wet days the traffic necessarily dwindles to almost nil. Why should not a road that would suit ricshas and bicycles at least be considered a fit object on which to expend money by those who can erect an almost palatial chamber of commerce.

The lime-kilns at Shihkweiyao still do a big trade and so does the Hupeh Cement Works (turning out 800 bags a day) under Danish management. We believe there is still a great future before this Yangtze port. May honesty and commonsense prevail and that result is assured.—*C. C. Post.*

Tokyo-Kobe Electric Railway

Yen 67,000,000 to be Expended

THE railway department has completed a draft plan for the electrification of the entire Tokaido railway, between Tokyo and Kobe, the work to be commenced from the fiscal year of 1923-4 and finished in seven years, i.e., 1920-30. The draft, as completed by the committee in charge, is now ready for the minister of railways, Count Oki, to approve for introduction in the diet. The details of the plan are as follows:

The total estimate of the cost of electrification of the line in question will be Yen 67,000,000, which will be expended in annual instalments for seven years, commencing from next year, when it is approved. The cost of repair of railways from the next fiscal year will be over-estimated and the bond policy will be reshaped, so that Yen 20,000,000 will be added to Yen 80,000,000, which was already decided upon by the government under the preceding ministry, to be secured by bond issues.

The greater portion of the cost of electrification will be consumed in building cars, amounting to Yen 35,000,000. There will be nine locomotives built for pulling special express trains, 46 for ordinary express trans, 107 for local trains and freight trains, 48 for express and large freight trains, 81 for shifting, totaling 291.

The unit of cost for building locomotives for special express trains is estimated at Yen 250,000 and for shifting at about Yen 70,000.

As for the plan of operation, since 1929-30 period is aimed at as the period of completion, the capacity to pull freight trains is estimated at 800 tons, passenger trains at 400 tons, so that there will be from 20 to 30 per cent. increase in the capacity as compared with the present.

The number of cars in a train will be increased from nine as at present for the steam trains to twelve or thirteen in the case of electric trains.

The time required in covering the distance between Tokyo and Kobe will be shortened by one to two hours, or in some cases by four hours. The time can be further shortened in future.

The power needed will be direct current, estimated for maximum use of 1,500 volts. Trolley lines are to be built over the present railway line. The power will be secured partly from the Akabane plant of the department after September, this year. The Shinano river hydraulic power plant, which is expected to be completed in 1926, will also supply power, in Tokyo and its neighborhood. The greater portion of power will be purchased from private companies.

Transforming stations are to be built at a distance of fifteen to twenty miles each, so that, for the entire length of 370 miles between Tokyo and Kobe, there will be about twenty-five such stations.

The work will be commenced from both Tokyo and Kobe, the middle sections being deferred until later years.

Whether the railway department will operate electric street car lines in the neighborhood of Kobe, Osaka, Kyoto and Nagoya has not yet been decided, in view of the existing private street car lines. It is, however, anticipated that such enterprise will be entered into by the railway department.

LIUSHUTUN WIRELESS STATION.—The new Liushutun wireless station, at Dairen, has cost Y.300,000 in round numbers. For its site, more than 15,000 *tsubo* of the old Li Hung-chang fort has been appropriated.

Three steel towers each 800-ft. tall, of triangular shape, have been erected. The antennae consist of over twenty lines. The equipments of the receiving and despatching power rooms and others is said to rank with the Funabashi station in which next to the Iwaki station, is the highest powered in the Orient. Hokkaido, Formosa, San Francisco, etc., are within communicable range. It is said that a message from a station in Germany has become sensitized on the new Liushutun station. Hitherto, foreign wireless have had to be transmitted by telegraph from the Iwaki or the Funabashi station after reaching there by wireless.

New Concrete Wharves at Singapore

Socony and A.P.C. Equip Malayan Island Stations with Re-inforced Concrete Piers

TO check the ravages of the pile worm on wooden piers, and to meet the increasing demand for petroleum by oil-burning steamers, both the Standard Oil Co. of N. Y. and the Asiatic Petroleum Co., have built re-inforced concrete wharves on their island stations near Singapore.

The American company's pier was completed last year at a cost of $175,000 Straits currency, and is situated on the British island of Pulau Sebarok,a leasehold about eight miles from Singapore which the Socony has held for some time. The wharf consists of an approach 10 feet wide, which extends into the sea for 900 feet, culminating in a T-head. On both sides of the T-head, at intervals of 150 and 250 feet, are four buffer dolphins, also of concrete, which are connected with the approach. Concrete mooring dolphins, ten feet square, are sunk behind and to the sides of the buffers.

The piles for this wharf, 200 of them, were cast on the beach of Pulau Sebarok. The sand and gravel of the island were used in mixing the concrete. Two sizes were cast, twelve and fourteen inches square. The longest piles were 60 feet in length. All driving was done by steam.

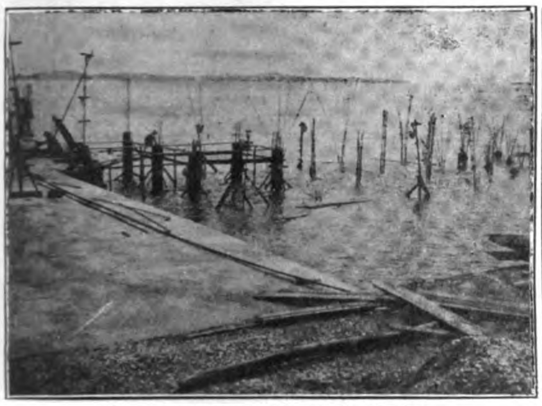
The end of the pier stands in 35 feet of water at low tide, and can accommodate any ocean-going vessel. The two sets of buffer dolphins makes it possible for two 500-foot ships to tie up at the same time. Both tankers and cargo-boats have been taking oil at Pulau Sebarok since the completion of the new pier. All the oil-burning vessels of the United States Shipping Board fuel here now.

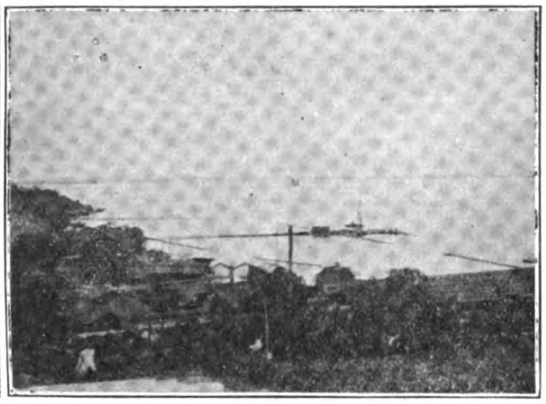
The Asiatic Petroleum Co. has been equipping two islands with re-inforced concrete wharves—Pulau Bukom, eight miles from Singapore in British waters, and Pulau Samboe, twelve miles away in Dutch territory.

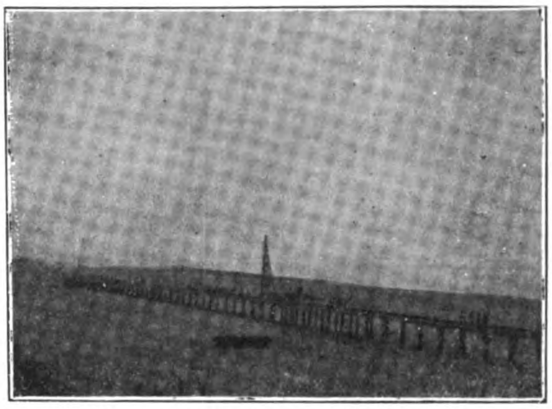
Wharf No. 2, on Pulau Bukom, was just finished in April of this year at a cost of $280,000. The construction is similar to the Socony wharf, and the whole project fits in with the new benzine installation. Wharf No. 2 extends out beyond a field of coral reefs which is being filled in and reclaimed. Here will be the plant which will handle and pack the benzine refined at the A.P.C. fields in Sarawak and other parts of the Malay archipelago.

Another deep-sea wharf, No. 3, on Pulau Samboe, is costing $150,000. While not as large as No. 2, it juts out into 35 feet of water, and can take care of ocean-going vessels. A $30,000 tong-kang jetty, to take care of native tongkangs, or lighters, has also been included in the re-inforced concrete work on Pulau Samboe. It is built in eight feet of water, and will be used in connection with the benzine installation.

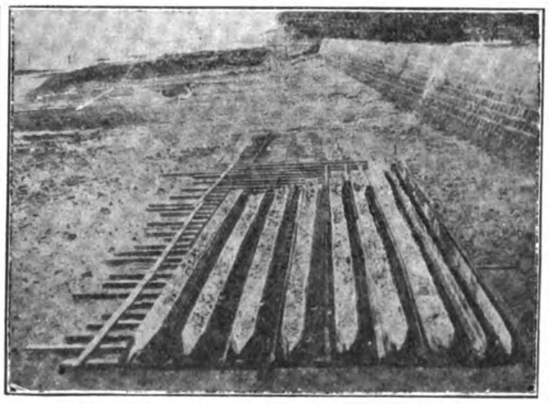
The construction of both Socony and A.P.C. has been carried on by the United Engineers, Ltd., of Singapore, under the supervision of A. F. Dale, head of the constructional civil engineering department.

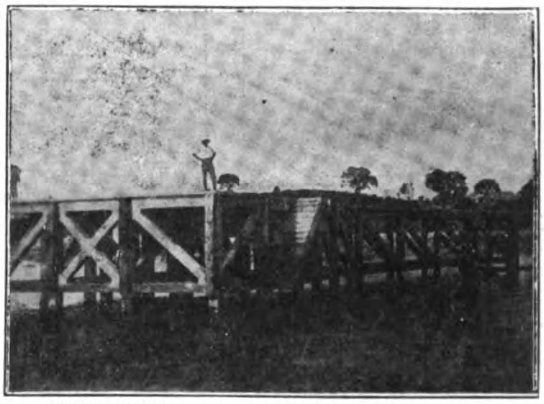

Construction work on the Pulau Bukom wharf


The A. P. C.'s new concrete wharf No. 2, at Pulau Bukom. The water from the end of the pier to the shore, which seems to be marked off in a rectangle, is all underlaid with coral, and is being reclaimed to furnish space for the new benzine installation


The concrete pier recently finished for the Socony at Pulau Sebarok

Indian labor casting concrete piles for the Pulau Sebarok pier


Sixty-foot piles for the Socony wharf


Thirty-five feet of water at low tide, permits ocean-going vessels to come alongside the new Socony pier at Pulau Sebarok

The Chartered Bank's New Building

FRONTING the Bund the new Chartered Bank building will be five storeys in height, of heavy, dignified, classic design, Neo-Grec in style with little ornament.

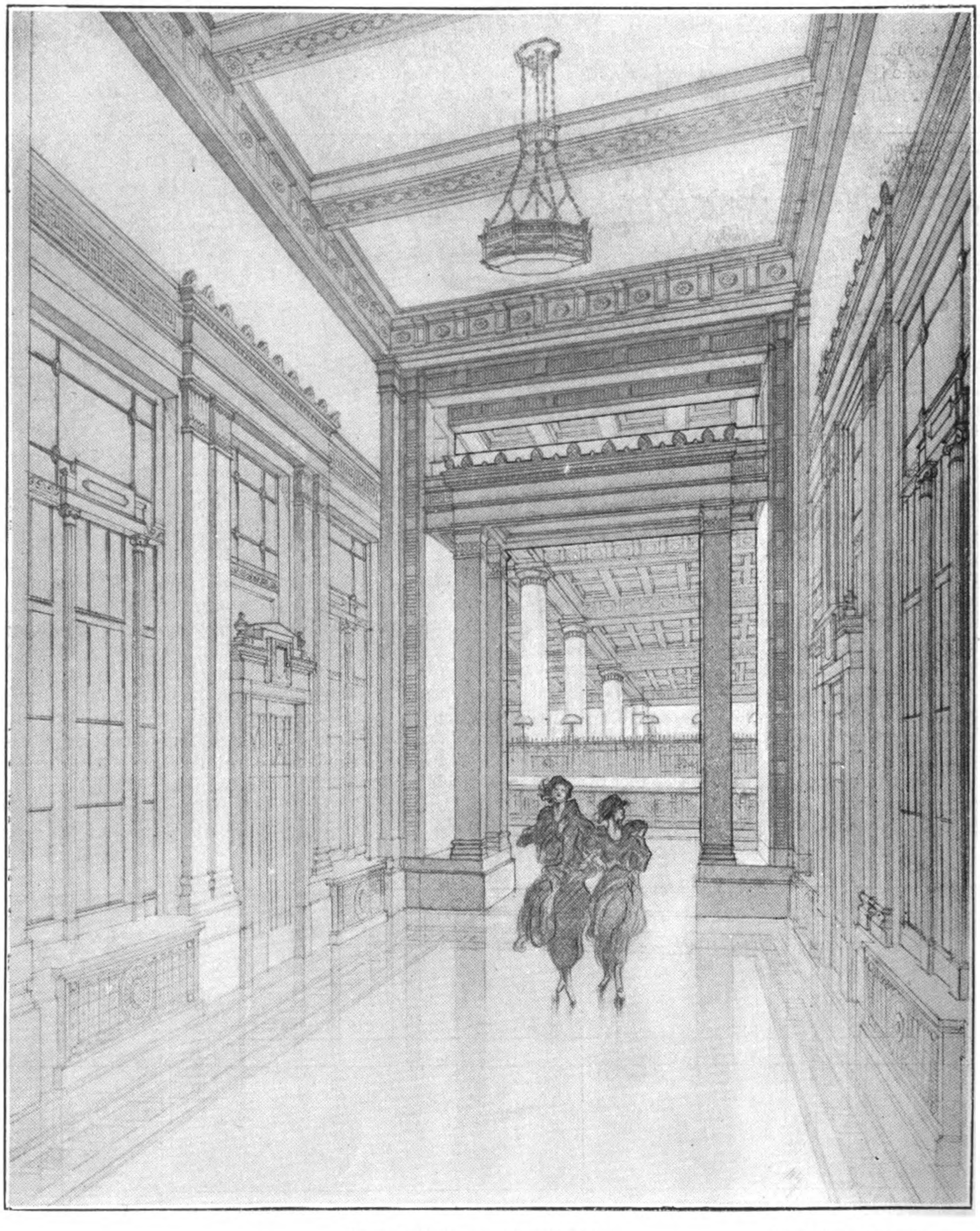
With the exception of the space occupied by the entrance hall and staircase giving access to the upper floors, the whole of the ground floor and subground floor will be occupied by the bank. The entrance to the bank will be a very fine pair of bronze gates made in England. The entrance vestibule is square in plan with four Brecchia marble columns, one in each angle, the walls are to be lined with Pavonazzo marble of a rich cream color with a black marble plinth. The floor will be in Roman marble mosaic and the ceiling of fibrous plaster.

The building is of steel framed construction with reinforced concrete floor and roof slabs, and fire-resisting throughout. The walls are filling only, the steel beams carrying the whole of the weight independently of the walls. The steel will be protected against corrosion and fire.

The foundation consists of two reinforced rafts, one for the main block and a separate one for the back block, where are situated the treasuries. Between the two rafts there is a straight joint. The site was piled with Oregon pine piles 25-ft. long.

The architects for the building are Messrs. Palmer & Turner, the design having been in the hands of Mr. G. L. Wilson, F.A.S.I., who has already done so much successful work in China.

The contractors are the well-known London firm, Messrs. Trollope & Colls, who, it is of interest to note, erected the head office of the bank in the metropolis some years ago.



Entrance Hall to the New Building *North-China Daily News*

THE NEW CHARTERED BANK BUILDING

North-China Daily News

Glen Line's New Building

IN style, the building is free Renaissance, with clear-cut lines and imposing design. It has a frontage of 300-ft. on The Bund and Peking Road and is 90-ft. in height.

The ground floor will be occupied by the offices of the Glen Line Eastern Agencies, with the entrance in the centre of the Bund frontage, consisting of an imposing portico with two granite columns, one on either side. Inside the main entrance is a semi-circular teakwood counter, the floor being of black and white marble terrazzo. The main office is lofty and dignified; the woodwork is all either of oak or teak, producing an effect of richness without ostentation and dignity without sombreness. The office occupied by the manager is a very fine room indeed, with panelled dado in teak, large fireplace and mantleshelf, of either side of which are large glazed cupboards. The doors to this room, and in fact to all the principal offices in the building, are large single panels with bolection mouldings.

Offices are also provided for the compradore and his staff, while there is a large strong room for books, and documents. The sanitary fittings throughout are of the most modern design.

A particularly delightful feature of the building is that the lighting is indirect, the electric lamps being concealed in large bronze bowls suspended from the ceiling, the light being obtained by reflection.

The remainder of the offices on the ground floor and all the upper floors are being let. The ground floor offices facing on to Peking Road have an imposing entrance. This office is one of the largest single offices in Shanghai, being 8,000 square feet in area.

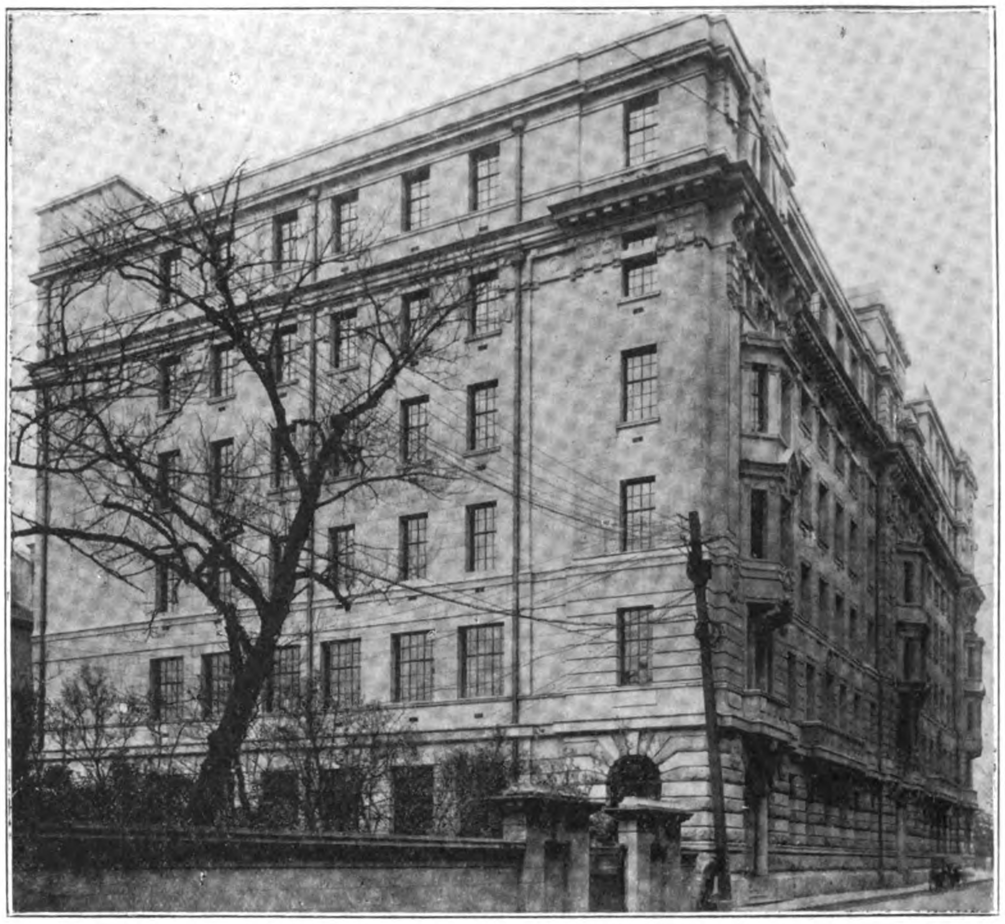
The main staircase is situated in the centre of the north wall between two lifts, and is approached through a wide archway. Two electric lifts give access to the upper floors, which are designed as large open spaces to be divided up so as to suit incoming tenants. Sanitary arrangements have been made so that each office has at least one lavatory. Strong rooms and coolies' rooms are provided on every floor, while there are separate stairways for coolies, which have been designed so that in an emergency they may be used as fire escapes. On the top floor there is a residential flat which is occupied by the general manager.

New Building of the Glen Line Eastern Agencies, Ltd., Bund and Peking Road, Shanghai
(Palmer and Turner, Architects)

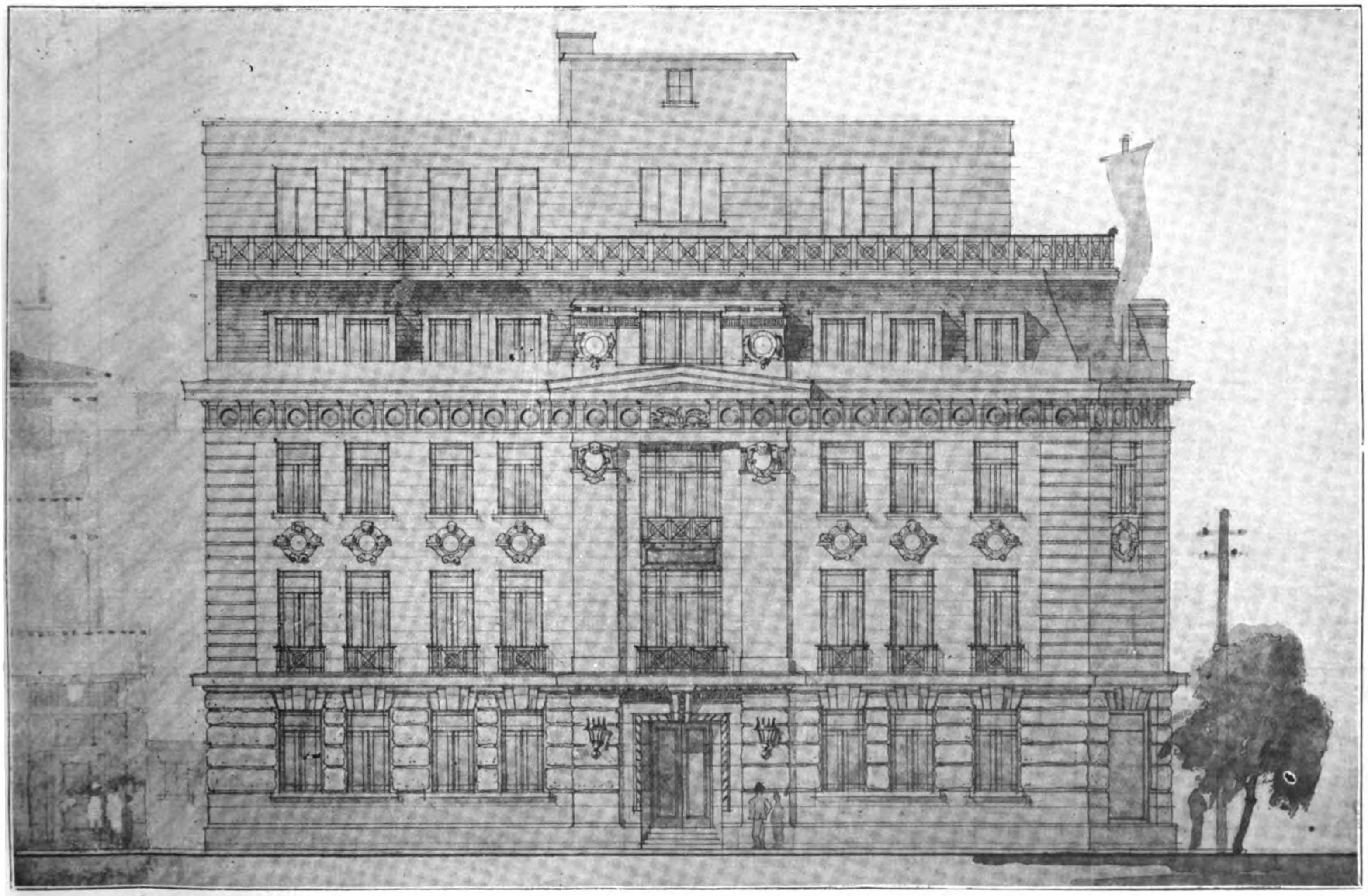
The building is fireproof throughout, built on the principle known as skeleton frame reinforced concrete, the columns, beams, roof and slabs all being of this material. The foundations consist of a raft of the same material, by means of which the weight of the building is spread evenly over the whole area.

The whole is warmed throughout by low-pressure hot water, while water is stored in tanks for domestic and fire purposes at convenient places. Special connections have been made to facilitate the work of the fire brigade in case of fire. The roof is flat with a deep ventilating space below connected to vertical ducts wherein are placed extra fans to circulate the air, thus keeping the upper floors cool in summer.

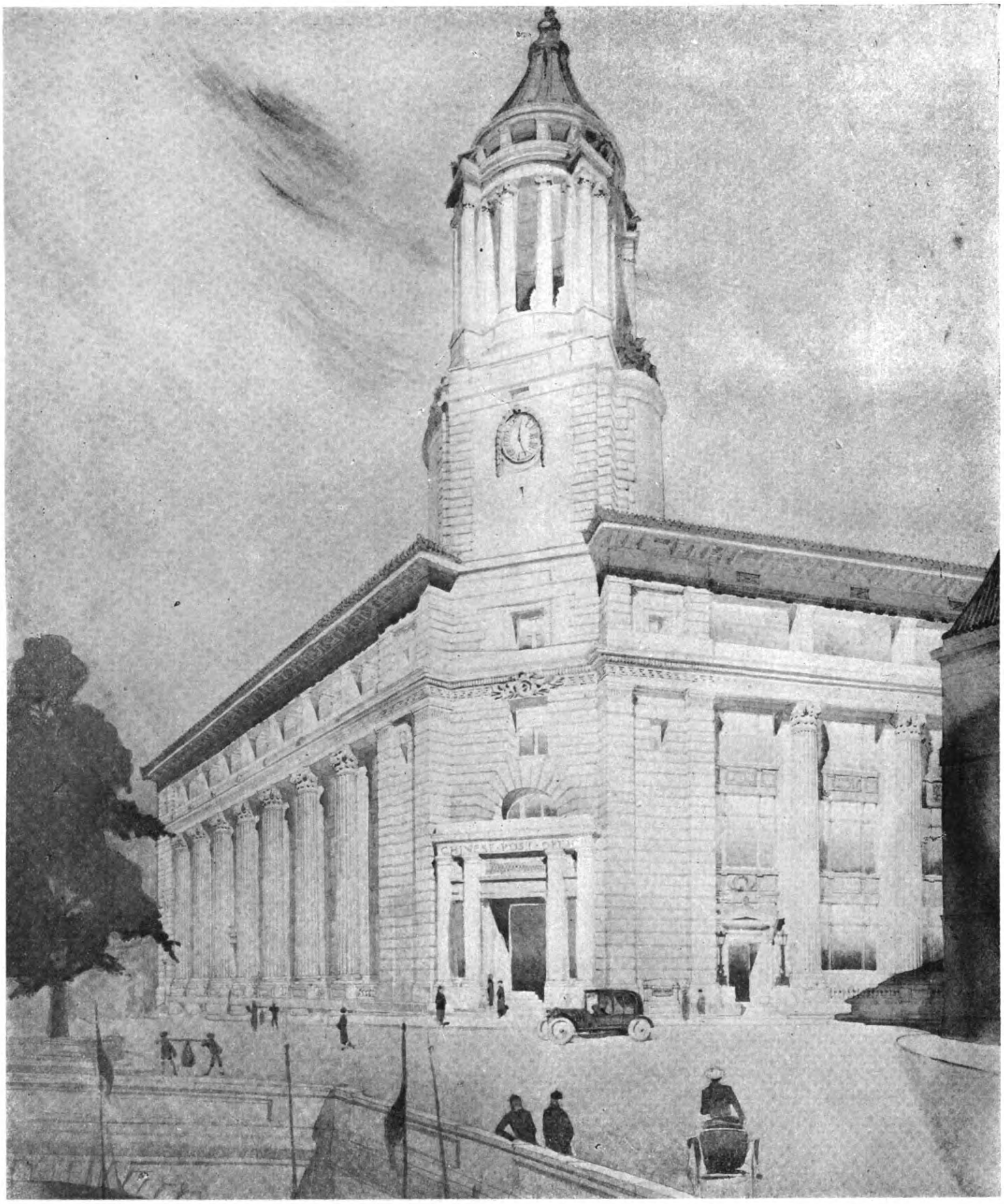
The architects are Messrs. Palmer and Turner, while the contractors are Messrs. Trollope and Colls, who have erected some very fine buildings in London and the Far East.



Glen Line's New Building, Peking Road Facade



New Office Building of the Shanghai Waterworks Co., Ltd. (Palmer and Turner, Architects)



NEW CHINESE HEAD POST OFFICE FOR SHANGHAI

THIS building occupies a commanding site at the corner of North Soochow and North Szechuen Roads, immediately across the new bridge, at present in course of construction.

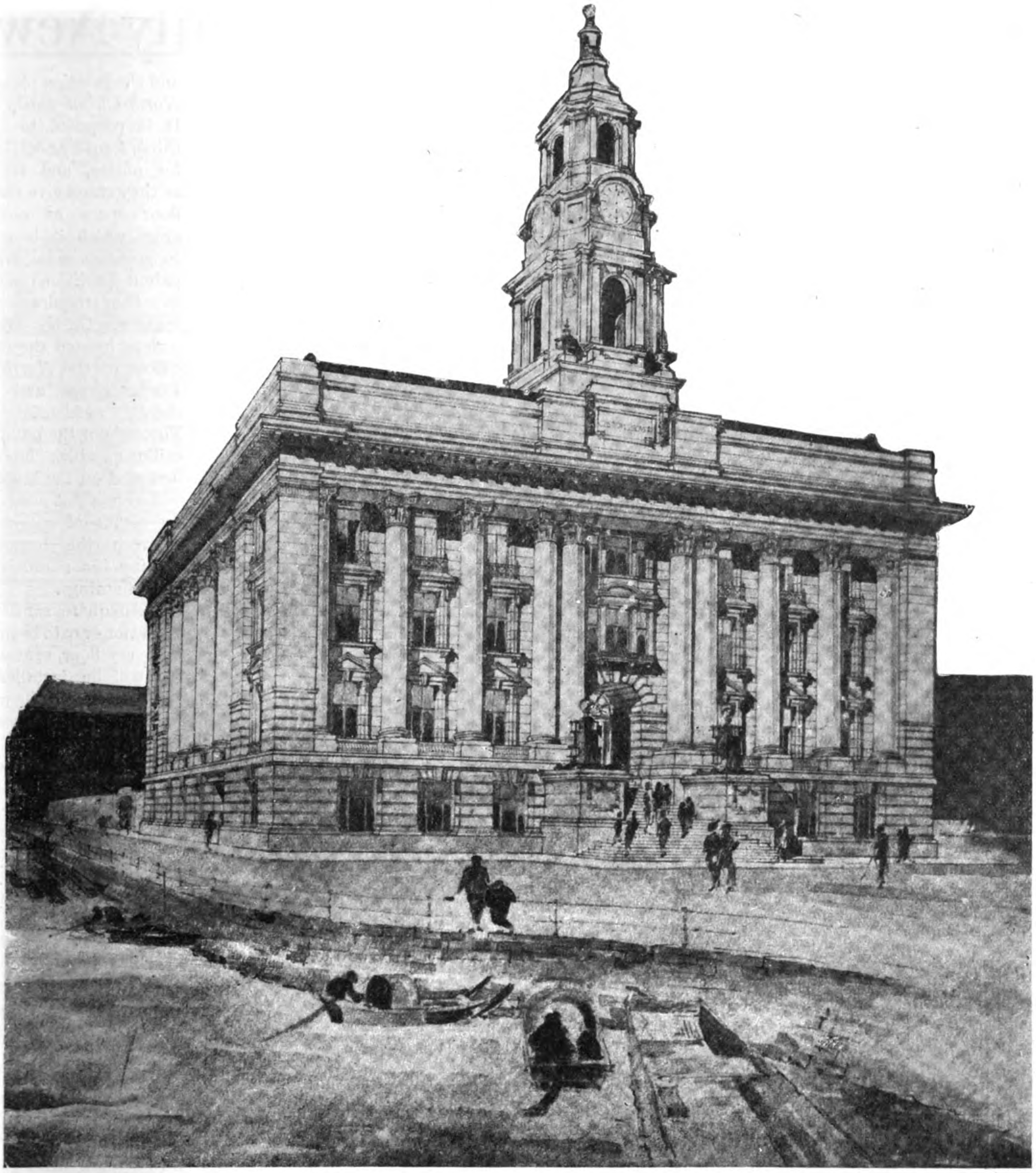
It is roughly U shaped in plan, 5 storeys in height, fronting upon North Soochow, North Szechuen and Tiendong Roads, with the various postal departments conveniently arranged to meet the requirements of the public and allow of rapid and efficient handling of in-coming and out-going mails. Flats and quarters for members of the staff occupy the top floor.

The principal facades to the North Soochow and North Szechuen Roads are designed in the form of a single massive classic colonnade rising direct from pavement to a height of more than 50-ft.

It will be constructed of granite in the lower portions and artificial granite above.

At the corner of these two frontages is placed a clock tower some 150-ft. in height, which forms a dominating feature of the design.

The architects are Messrs. Stewardson & Spence, who obtained the award in the competition recently held.



New Custom House Building for Hankow

THIS building will stand on the site of the old custom house at the end of the Bund of the British concession.

The new building is four storeys high, surmounted by a tower rising to a height of nearly 150-ft. above the pavement. Liberal accommodation for the various departments of the customs service is provided on the ground, first and second floors, while the third floor is given up to two spacious residential flats.

The building forms an almost square plan with sides of approximately 120-ft., faced throughout with Hunan granite.

The principal feature of the elevations to the river, Ho Kai and the face looking down the Bund is a massive Corinthian classic order running through three storeys, with solid granite columns four feet in diameter. The order rests on a heavily rusticated basement storey and supports a full classic entablature and strongly emphasized solid parapet wall above the same. The main entrance is of liberal dimension and faces directly down the Bund. It is approached by a very broad external granite staircase, rising through the whole height of the ground floor to the first or principal floor of the building.

The entrance halls and principal corridors will be suitably treated internally with marble and mosaics.

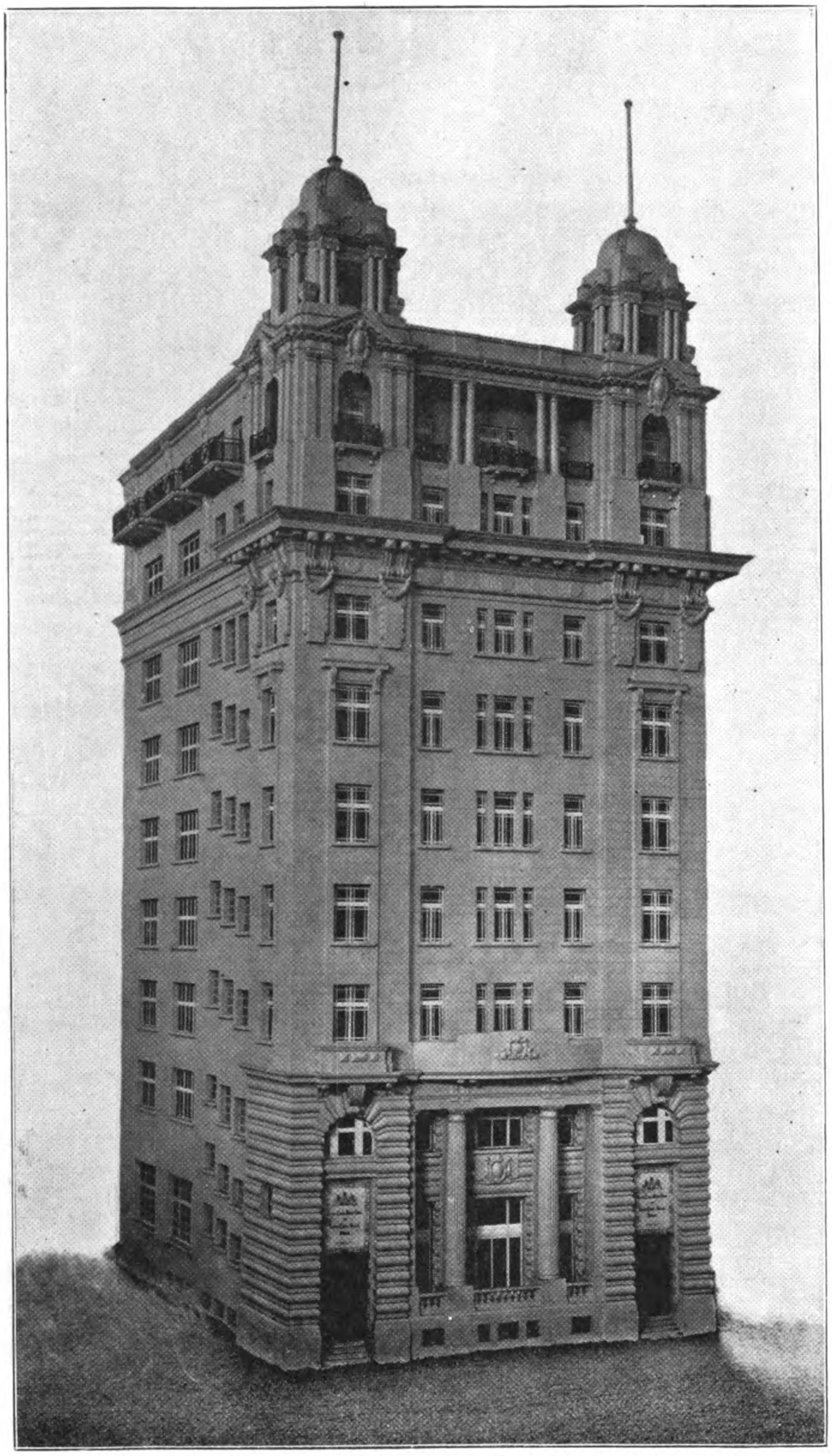
The architects are Stewardson and Spence, who obtained the award in the recent competition for the work, while the general contractors are Why Ching-kee. The heating and sanitation is in the hands of Messrs. Gordon & Co., Ltd., and the steel windows will be supplied by Messrs. Henry Hope.

New Home of the "North-China Daily News"

THE new home of the *North-China Daily News* will be the tallest office building in Shanghai. Due to the width of the Bund this is possible, for elsewhere in the city the building by-laws prevent the erection of an edifice higher than one and a half times the width of the road. Consequently the eight storeys that are planned with the twin cupolas, one at each end of the facade, will attain a height of 140-ft. as against the Palace Hotel which is just a little under 100-ft. This applies to the front portion of the building, the greater half; for the back part of the building only seven stories are contemplated. The whole will stand on an area with a 61-ft. frontage and a depth of 170 feet, these being the dimensions of the building itself and not the plot on which it will stand.

Built of reinforced concrete throughout, with granite facings, the front of the new offices will present a dignified appearance to the Bund with a well proportioned facade in which handsome fluted columns will form the main motif, the flat roof being adorned with two towers surmounted by gilded cupolas, and between them will be erected the flagstaff.

On the ground floor accommodation will be provided for banking offices, with entrance at the northern end of the frontage. These offices will occupy the whole of the ground floor, a portion of the next floor being allotted for general offices, and the printing plant of the *North-China Daily News*. It is proposed to use the third, fourth and fifth floors for offices, and the plans as they stand give the whole floor space as one large area, which it is designed to sub-divide by means of patent partitions according to the requirements of tenants. On the fifth floor will be located the editorial offices of the *North-China Daily News* and above them residential flats. Throughout the building the ceilings, which have been designed on the latest lines, will give a flat even surface by means of patent filling between the beams supporting the reinforced concrete floorings.



Photograph of Model of New Building of the North-China Daily News & Herald, Ltd.

Adequate sanitary installations are to be provided on every floor, central heating will be installed, and three passenger lifts will run, in addition to the necessary number of staircases. On the outside of the building there will be emergency staircases, for use in case of fire, which should be unlikely in view of the nature of the fireproof construction, giving all the necessary facilities for escape from the building in case of an outbreak.

The rear half of the building, seven storeys in height, will be separated from the front building by a hollow double wall designed to deaden the sound of the printing machinery at night. Here will be housed the presses, lino-types and all other essential equipment of an important up-to-date printing establishment, while sufficient space will be allotted to storing of paper and other supplies.

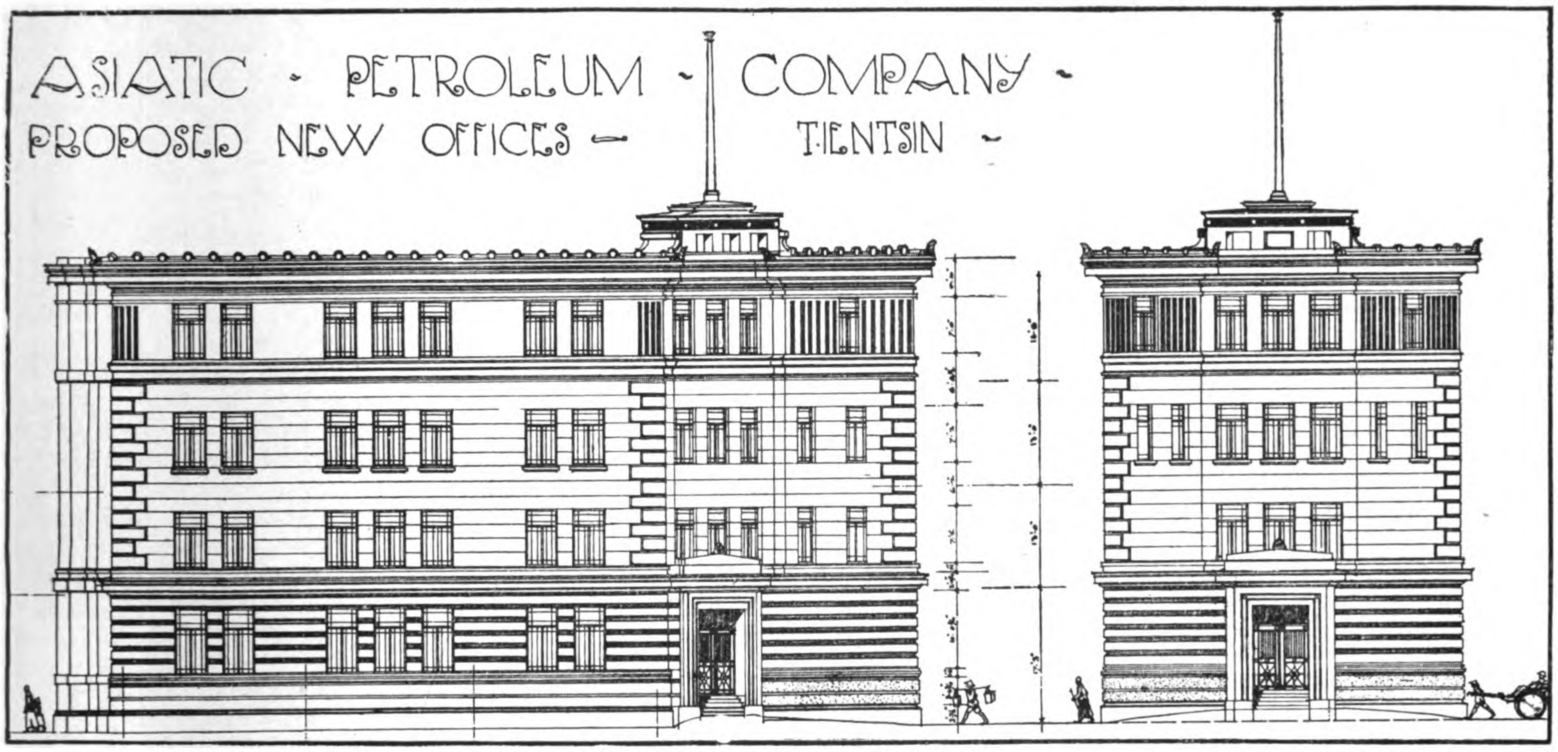
Netherlands East Indies Railways Electrification

After close study of conditions extending over several years, the Dutch East India authorities have decided to electrify the whole railway system. Direct current at 1,500 volts is to be used, but later the Batavia-Sourabaya section may be raised to 3,000 volts direct on a single-phase system if conditions warrant.

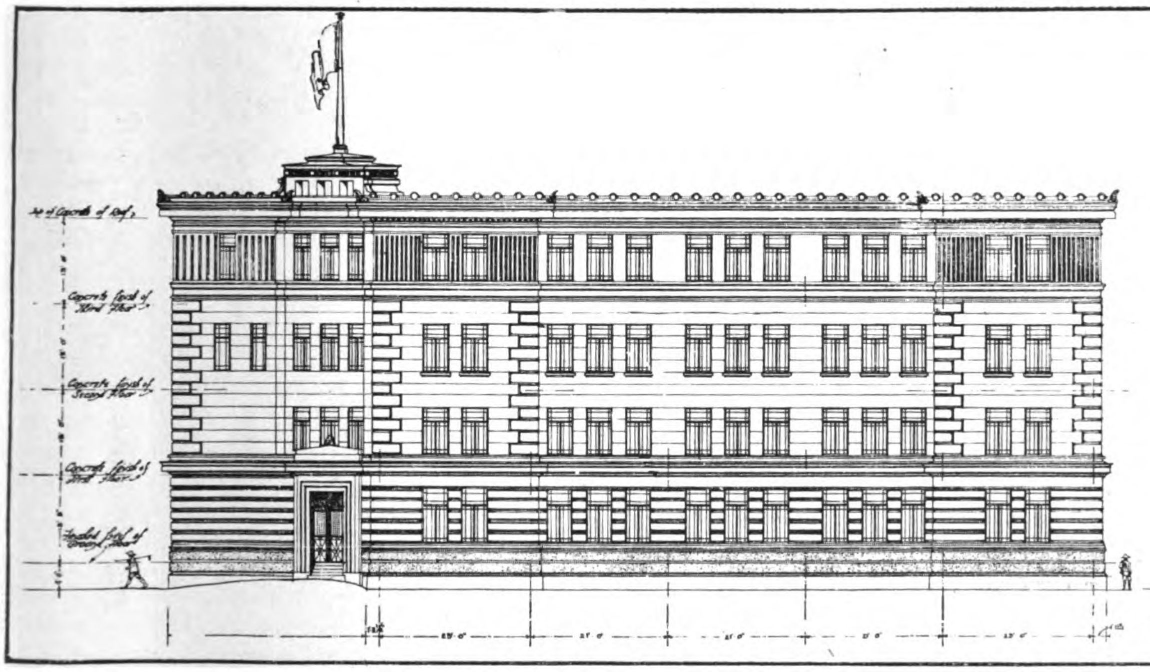
Two power stations, giving about 40,000 horse-power, are being erected, one to the south-west of Sukabumi on the Tjitjatih, about 63 miles from Batavia, and the other on the Tji Anten, about 44 miles from Batavia. It is estimated that of this 40,000 horse-power, 30,000 will be required for the line and that 10,000 will be available for light and power in other directions.

It is expected that the first part of the line, between Meester Cornelis and Tandjong Priok, will be in operation early next year.

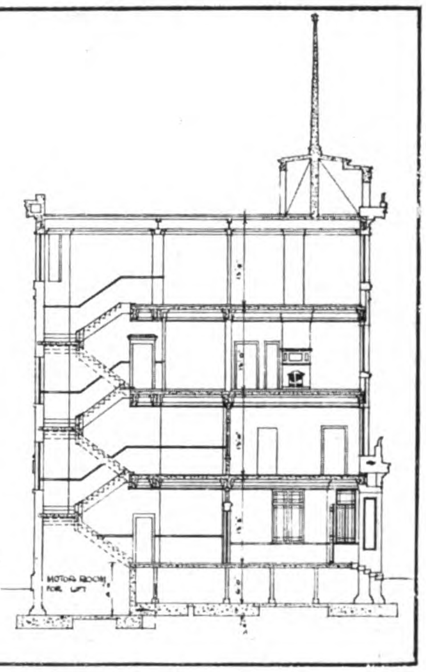
Tandjong Priok is sharing to a large extent in the awakening of activity observable in the Far East, and the electrification of its rail service should assist its development and add to its importance. A project is under consideration to erect a tin-smelting works at this part, and British experts have been consulted to assist in the decision as to whether open or closed furnaces should be used. Once this question is settled it is expected that the work of erection will proceed.



Elevation to Meadows Road., S.E.



Elevation to Taku Road, N.E.



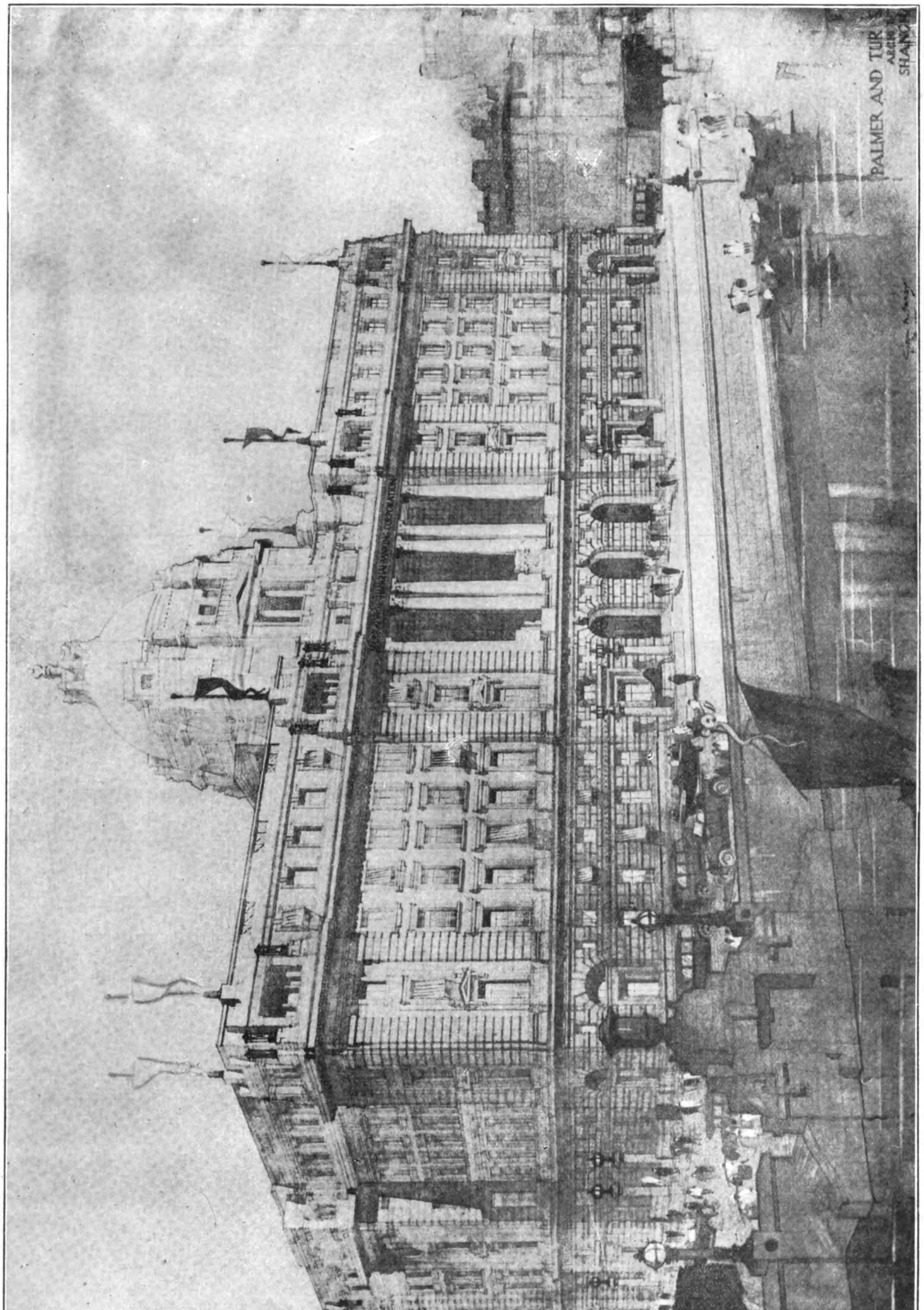
Elevation of Circular Portion at Corner Section A.B.

Asiatic Petroleum Company's Offices at Tientsin

THE plans show a four-storey office building with living quarters above, to be constructed for The Asiatic Petroleum Co., Ltd.

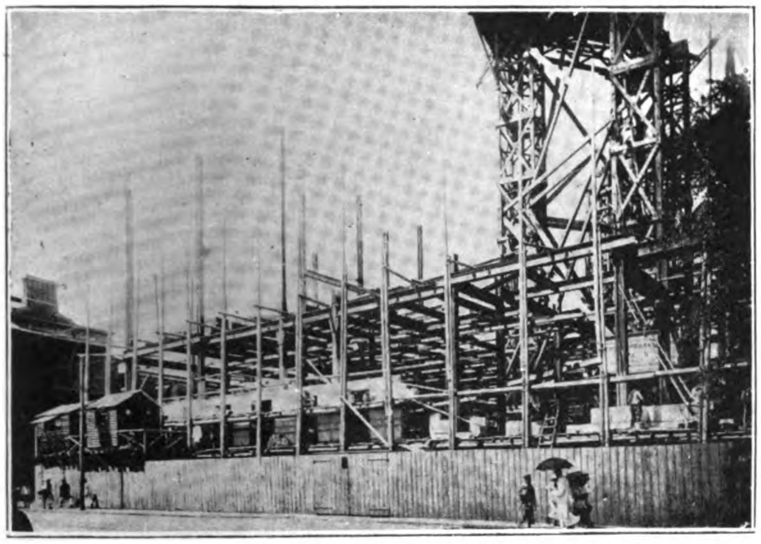
The building will be a steel-framed structure with granite facing. It is finished throughout in first-class modern style ; central heating and electric lift are provided. Special precautions are being taken against the extremely cold winds of winter and the dust-storms spreading from the Gobi Desert, double windows being provided where necessary. The building is fire-resisting, and is to be fitted throughout in a serviceable and up-to-date manner, due regard being had to the making for cleanliness and reduction in cost of upkeep.

The architects are Palmer & Turner, of Hongkong, Shanghai and Hankow, whose London address is c/o Mr. F. Oswald Reynolds, M. Inst. C.E., of 109 Victoria-street, S.W.1.



THE HONGKONG AND SHANGHAI BANKING CORPORATION'S NEW BUILDING AT SHANGHAI
Drawn by Cyril A. Farey: Palmer and Turner, Architects

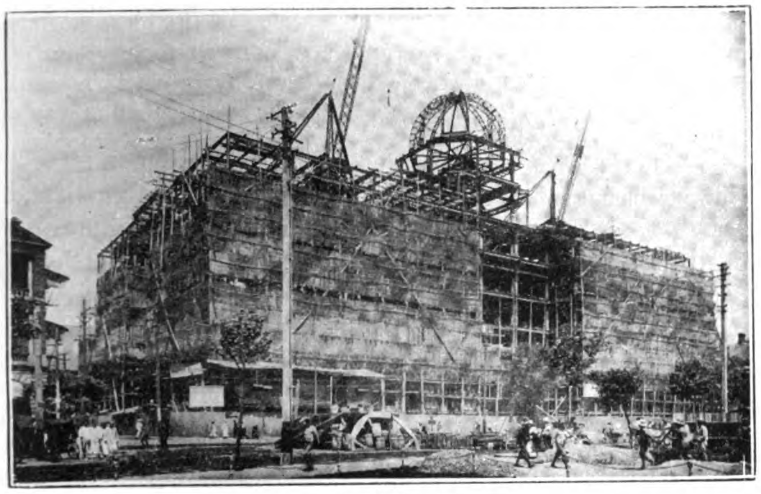
PROGRESS VIEWS OF BANK BUILDINGS IN SHANGHAI



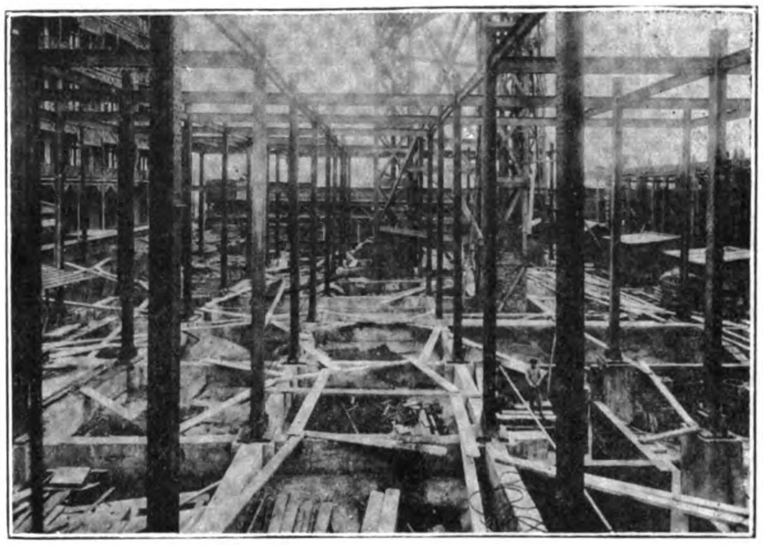
The Hongkong and Shanghai Banking Corporation Building, Shanghai, August 2, 1921

THE SITE OF THE NEW CHARTERED BANK BUILDING, OCTOBER 16, 1921

View of Excavation for Front Block, Looking East. Palace Hotel on left and some of the old piles in background. Concrete Mixer on left



June 19, 1922



View on February 28, 1922. Looking East towards Bund Front

OFFICE HELPS IN CHINA

In a recent contest at Shanghai an American adding machine proved its superiority over the abacus, the age-old calculator of the Far East, to such an extent, according to Trade Commissioner Lynn W. Meekins, that the latter lost a good deal of the veneration it heretofore received. Up to the time of the contest, which was between an American salesman for the adding machine and a Chinese adept in the use of the abacus, the latter device had been regarded as an insurmountable obstacle to the general sale of the former in China. The contest was witnessed by a large number of spectators, according to Mr. Meekins, all of whom were surprised by the marked superiority of the American device.

"With more than 8,000 foreign firms, including Japanese, hundreds of native progressive firms in the treaty ports, and numerous government offices," Mr. Meekins says in a report to the bureau of foreign and domestic commerce, "China is buying a steadily increasing quantity of American office specialties annually. For several years the value of exports of American typewriters to China has averaged about $250,000. Adding and calculating machines, duplicators and devices—such as check protectors, time and date stamps and pencil sharpeners—are being sold in the large commercial centres. Metal furniture is in demand on account of climatic conditions along the China coast, and filing and loose-leaf equipment is finding a fair market.

"American firms in Shanghai are actively pushing the sale of office specialties with very satisfactory results. By sending experienced representatives to demonstrate the merits of modern equipment to business men in the outports, they are in a position to take orders and make prompt delivery from stocks carried in Shanghai."

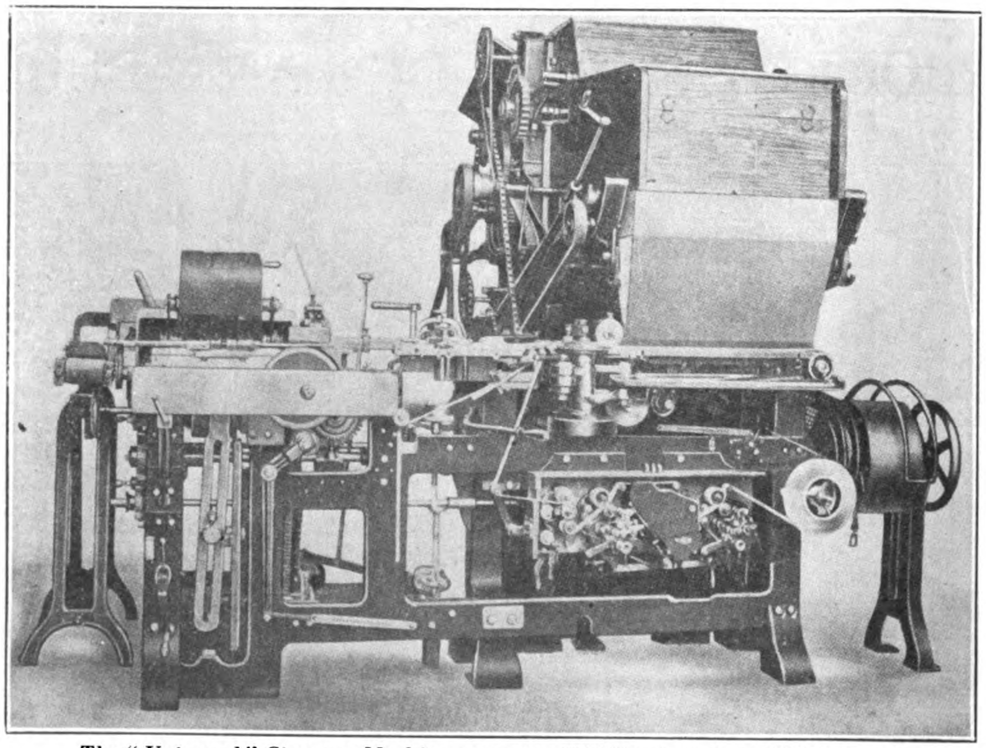
New Cigarette Machine

Expected to Revolutionize Cigarette Industry

ADVICES have been received from our American correspondents advising that a machine for making cigarettes of entirely new design and construction has been placed on the market.

This machine, which is called the "Triumph—Model UG" is capable of making 800 plain or tipped cigarettes per minute, or approximately one-half million cigarettes per day. Devices can be furnished for making either round or oval cigarettes to be pasted or crimped, either plain or with tips of gold, cork or paraffin.

Aside from this phenomenal production which is practically double that of any machine formerly known, the machine is a marvel of simplicity and can be operated by inexperienced girls. Simplicity and durability have been combined, and cigarette producers at least can secure a machine with a minimum of parts subject to wear and which have to be replaced.



The "Universal" Cigarette Machine, capacity, 250,000 crimped or 275,000 pasted cigarettes per day of ten working hours, manufactured by the United Cigarette Company

Will the casual smoker preoccupied with his daily cares, who enjoys the soothing balm of the cigarette, stop to consider that his smokes are made at the rate of one-half million per day on a single machine operated by two girls? Perhaps he will also be interested to learn that Virginia, the home of tobacco, has also fostered and given to the world the mechanical means for making cigarettes.

Nearly a half century ago the original cigarette machine named "Bonsack" was introduced by the United Cigarette Machine Co. of Lynchburg, Virginia, whose "Universal" and "U-K" models are also known in every corner of the world. The latest achievement of the pioneers of the machinery for the great industry is their new model "TRIUMPH" machine which the manufacturers state will revolutionize the industry.

The Lungyen Steel Works

IN the March number of THE FAR EASTERN REVIEW was reprinted an article from the *Journal of the Association of Chinese and American Engineers* describing the new Lungyen steel plant in North China. The article, however, failed to mention the prominent part in the erection of the plant assigned to the French Engineering Works of Shanghai (Société Franco-Chinoise de Constructions Metalliques et Mecaniques) more familiarly known under its old name of the Nicolas Tsu Engineering and Shipbuilding Works. This company had full charge of the erection of the blast furnace plant and all the structural steel and it was due to their organization that the work was carried out successfully in such a comparatively short time. Starting August 2nd last year, progress was at first slow, the erectors being hampered by the frequent and unlooked-for delays in the arrival of material from America, and by the necessity of purchasing or making many special tools and other materials at their Shanghai plant and shipping them north. Communications between Shanghai were many times interrupted, delaying the arrival of tools, skilled workmen, etc.

This achievement is a time record upon which the French works may justly pride themselves.

The work comprised the following items :—

One blast furnace of 250 tons ; one skip bridge ; one coke bin ; four hot blast stoves and chimney ; platforms around stoves and chimney ; bleeders, downcomers, dust catchers, gas mains to the stoves and the boilers, hot and cold blast mains to the blowers, etc. ; three boiler chimneys ; one boiler house ; one power house ; one cast house ; pump houses ; water tower ; other auxiliary structurers. The total weight of all structural material was about 1,800 tons.

The Lungyen Steel Works

Japan Gets Cable Contract

A contract is reported in Japanese circles to have been concluded between the Chinese government and the Furukawa Mining Co. It calls for the laying down of a cable between Shanghai and Chefoo, a matter which has been hanging fire for some considerable time, partly due to the anti-Japanese movement let loose by the students with an energy worthy of a better cause, and to a large extent on account of the chronic lack of funds on the part of the Chinese government.

The Furukawa Mining Co. is not only one of the largest Japanese industrial corporations, but one of the most important in the entire business world.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI, CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, JULY, 1922.

Machinery Trade in China

Why British and American Manufacturers of High Grade Machinery and Machine Tools Suffer in the Competition for Chinese Trade.

THE following remarks on the machine-tool trade of China from the Hongkong correspondent of *The Times Trade Supplement* contains certain facts that all foreign manufacturers of machinery will be wise to take notice of. We do not altogether agree with the writer's assertion that the Chinese are always looking for the cheapest bargains, for if this were true, there would be few sales of high-grade machine tools in this country. His remarks, however, do hold true to a large extent as far they relate to the smaller Chinese machine-shop owners. The essential point in what he says, is embraced in the statement that "*It is unfortunately true that the Chinese feel that they are taking a risk in buying almost any machinery, because very few are able to judge the merits of design or construction.*" We invite attention to this, as herein lies the answer as to whether engineering advertising in Chinese papers is of any value. In the first place, there are no equivalents in the Chinese language for foreign technical terms, and there is no way to bring out forcibly the merits of any particular machine. The best that can be done is to appeal to the foreign-educated Chinese engineer, who is consulted at some stage of the negotiations for any large order, and his opinions acted upon.

About all that can be hoped for is to educate the Chinese to the reputation of a name or chop and what these names stand for in their particular line. In other words, the same process of education must be carried out in China, Japan and other Oriental countries, that has proved successful in other parts of the world. The machinery manufacturer must follow the same publicity methods as he would at home, advertising his own specialities under his own name. The tendency to group a large number of manufacturers under one representative or selling agency in China, has its merits in cutting down the selling overhead, but in this zeal to decrease expenses, the question of publicity is invariably ignored. As a consequence, the Asiatic purchaser of machinery, who has not been educated to the merits of mechanical specialities made by well-known foreign firms, has no option in the matter. He simply insists on having the cheapest machine tool or other machinery that will do the work. In a field where the manufacturers of all nations are evenly represented, and where quality in many cases is sacrificed to price and terms of payment we cannot blame the uneducated Chinese from placing his order with whoever quotes the lowest and gives long credits. The fault does not altogether lie with the Asiatic. It must be shared by those manufacturers, who for years have turned a deaf ear to all suggestions about proper publicity in this field, insisting that his agent stand the full burden of educating the Asiatic in engineering matters. The Chinese, like the Japanese, *can* be educated to purchase high-class machinery and machine tools, but to do this requires a radical departure from present publicity methods. The manufacturer must make up his mind that if he is to succeed in this field, he must select an engineering medium for his advertising and stick to it, in the same manner that he does at home. The cumulative effects of such advertising are the same. Most of the successful machinery manufacturers in this part of the world are those who years ago recognized this fundamental principle in Asiatic business and are now reaping their rewards in orders.

In some cases that we could mention, these methods have obtained for the manufacturer a practical monopoly of the business in their respective lines. Proper publicity will strengthen the hands of local agents and make for increased orders, the same in China as in the United States, England or other markets. When the manufacturers of high-grade machinery (British, Americans, or of any other country) realize and act on this fundamental truth, the day will arrive when the Chinese buyer will be as discriminating as those of any other country.

The root trouble with most large foreign manufacturers whose names are well known to engineers in other countries, is that they assume, as a matter of course, that the prestige of their name has also spread to China, and the mere fact of hanging out a brass sign along with a dozen or more in front of some agent's office, is going to duly impress the field with the fact that he is in China to do business. As a matter of fact, the name of the greatest manufacturer of any specialty (especially in the engineering lines) means nothing to the average Chinese. They refuse to be impressed. The manufacturer who makes good in China is the one who has the initiative to take upon his own shoulders the expense of advertising his engineering specialities in an engineering publication.

Following this up by a proper campaign that will make his particular name and specialties known to the field. It is the only road to success in Asia.

Such advertising may not reach the smaller Chinese, Japanese or other Asiatic machine shops or mills, but it will reach the more important, and pave the way for the education of smaller concerns, who, as they expand, will demand the higher grade tools and machines that have proven successful in the larger plants. The following article was intended primarily for British consumption, but the same facts hold good with high-grade machine tools from other countries. It is not altogether German competition and low prices which attract the Chinese buyer. The Japanese machinery manufacturer is also very active and many of their specialities have found a secure place in the Chinese machinery trade. The number of machine tool and machinery manufacturers in Japan is constantly increasing, and their products are considered good enough for the vast majority of Japanese machine shops. They will also find their place in the smaller shops of China and other parts of Asia.

The time has arrived when other machinery manufacturers must face these facts. If they lose the market there is no use of blaming the Chinese for their lack of appreciation for better grade tools and machinery. Educate them in the same way other peoples have been educated and they will demand the best.

G. B. R.

The Hongkong correspondent of *The Times Trade Supplement* writes:

"A few days ago a representative of a Danish machine tool company arrived in South China. Although the traveler did not bring his prices directly to the notice of the writer, it has been possible to obtain a copy of those quoted to local firms. They seemed at a first glance to be remarkably low. This led to enquiries concerning the local selling prices of British machine tools, and the results are of considerable interest.

"It should be understood that the present discussion is confined solely to the question of price, ignoring considerations of quality. In the eyes of the Chinese buyer, however, the price means almost everything. A local agent showed a Chinese from Canton a price list in which a certain machine tool was quoted at £50. The Chinese customer immediately said: 'I buy that one—velly cheap. Suppose no good, lose only a few hundred dollars.' It is unfortunately true that the Chinese feel that they are taking a risk in buying almost any machinery, because very few are able to judge the merits of design or construction. Many Chinese buyers of engineering products are unable to distinguish between a very good article and one that is lighter and generally not so reliable.

"Consider first of all the local selling prices of screw-cutting 6-in. lathes. The price of a British lathe is £267, while the foreign-made machine can be supplied at less than half the price—namely £130. It is noticeable that on this list of foreign lathes there has been a reduction since last year. Then the price was £130. No doubt the British lathes have also been reduced in price, but it has not been possible to obtain a list. British manufacturers do not publish their prices as freely as the Chinese would like. The exception is the motor industry, and other engineering manufacturers might follow that lead.

"Take now 8-in. lathes. A local quotation for a British lathe is about £400; the foreign-made machine can be sold in South China to £230. Again, the British 10-in. lathe, which is quoted locally at £537, seems to the Chinese buyer ridiculously high in price as compared with its competitor, which is quoted at £325.

"It would be possible to give many similar comparisons, but the general result would be much the same. It may, however, be noted that this price list of the non-British machine tool company is in English, and that the lathes have such essentially British names as "Lion" and "London" and 'Calcutta.' One lathe is called 'Britannia'!

"For American machine tools it has been difficult to obtain local prices, but the Chinese say that they are lower than those quoted for British machine tools.

"It will surprise some readers of this journal to learn that a certain shaping and planing machine giving a 10-in. length of stroke (hand power) is quoted at £20 for local sale. A British shaping machine (stroke to 12-in.) costs £200 in China, whereas this foreign firm sells a 10-in. machine (not hand power) at £50, and a 16-in. machine at £106. Last year the latter machine was priced at £126. British 16-in. to 18-in. machines are quoted locally at £250, while the foreign firm will supply a 22-in. machine at £150, the 18-in. machine being £120.

"To quote comparative prices of planing machines, a British machine 6-ft. by 30-in. costs locally £625; a machine of very similar dimensions from another part of Europe costs £370. The latter is called the 'Asia,' doubtless with the idea of conveying the impression that it was built for this market.

"A British 25-in. drilling machine costs locally £215, while its foreign-made rival, a 24-in., costs £68. That is just about typical of drilling machines.

"These figures were supplied privately by one of the local agents who much wishes to sell British machine tools. They were given in all good faith, and while it may be true that in the course of business they may vary a little, yet for comparative purposes they may be accepted.

"Unfortunately, it is not only in the machine tool industry that the British agents in China find themselves hopelessly undercut. At present local conditions make the British engineer in the Far East none too happy concerning the supply of machinery from Britain to China. Prices must come down if more trade is to be done.

"These facts are set forth not in any croaking spirit, but with the sole desire that those interested in Great Britain will realize what is happening. Many believed that after the splendid organization of the munition factories in Britain the costs of production would go down so quickly that the factories 'at home' would be kept busy with orders from overseas markets. No attempt is here made to allocate the blame for the existing high prices. They may be due either to labor, capital or to politicians.

"With these details the Chinese buyer is not concerned. He wants an inexpensive article, and although there have been times when he has gladly paid a high price to obtain British machinery, such occasions are scarce. When it is a matter of buying a lathe or drill, names of makers mean very little to Chinese purchasers, who know nothing of machinery, and therefore it is suggested that British machine tool manufacturers should give special consideration to the Far Eastern market. There should be a permanent exhibition of such tools in South China.

"All that one can hope just now is that prices of British machinery saleable in China will fall rapidly.

"It is true that large orders for British machine tools have been sent from South China to England since the war. They have been for tools for the local dockyards, the largest two of which are controlled by British subjects. Their advisers evidently persuaded the directors to pay the high prices in order to get the best article. It is said that one of the local dockyards has given orders for nearly a million dollars' worth of British equipment for its extensions and re-organization. Many other South China firms follow their most excellent example, for every patriotic Briton wants the workshops of the old country to be full of orders."

* * *

Another factor in the Chinese machinery trade which has a marked bearing on the success of German firms is pointed out by the Peking correspondent of *The Engineer* of London, who says:

"For some time there have been indications of considerable activity on the part of the Chinese who were associated in business with the Germans before the war. Germany is fast recovering her pre-war trade with China, and in doing so she is assisted by the methods she has adopted in closely co-operating with the Chinese. Germany always had many Chinese friends, both commercially and politically, and for the past three years they have jointly created sales and other organizations which have been the means of gradually restoring Germany's pre-war trade. It is undoubtedly a fact that most of the present German enterprise in China is an offshoot of the Stinnes syndicate, and the Germans are doing their business in such a way that competition amongst themselves does not exist. A surprising feature is their ability to finance most of the contracts they get and to give long credits—which the Chinese must have. As the Germans can no longer exercise extra-territorial rights in China they enjoy the same privileges as the Chinese, and in this way can own property anywhere in the interior. The Chinese law prevents the natives mortgaging their property to any foreigner enjoying extra-territorial rights, and under these conditions the Germans will benefit very considerably in the future. For instance, there are literally hundreds of such enterprises as mines, cotton mills, flour mills, electric light works, waterworks, etc. etc., which have already been organized, registered and sanctioned by the government, but have been unable to raise all the capital that is necessary to purchase equipment, etc. It is very often unsafe to sell machinery for such purposes on a system of extended credit unless ample security is provided quite apart from the equipment itself. This the Germans can and do get by an unqualified mortgage on the whole of the properties belonging to such a company.

"One often hears very pessimistic views about the inability of British manufacturers to compete with German prices, but most people forget that business in China does not always go to the lowest bidder. It generally goes to the firm from which the Chinese can get the best financial terms, and whilst in many cases a British merchant representing the manufacturer is willing to give easy terms of payment, he cannot obtain the sound security that he must have. There is not a single electric lighting scheme in China that does not pay handsomely, and most of them would yield even higher dividends if 'squeeze' were eliminated. In spite of this success there are hundreds of towns waiting for electric light and almost as many Chinese companies formed with a proportion of the required capital. These companies require the machinery on easy terms of payment, and the only people who can give it to them now are the Germans, who are willing to do so and take up debentures in the companies in lieu of payment. Arrangements can generally be made whereby a foreign chief engineer controls the operations of the company pending redemption of the debentures. In this way 'squeeze' can be reduced to a minimum.

"The question now arises: Is there a remedy for this state of affairs or are we to sit still and allow the Germans to capture the cream of the trade which we have had for so long? Nearly three years ago a charter was granted by the Chinese government to a group of British and Chinese interests which formed the Chinese-British Trade Corporation. Participation in this company was subsequently offered to British manufacturers through the federation of British industries, but it appears to have died a natural death through various causes. It is not too late to revive this company and out of it evolve a really workable organization. Under the terms of the charter it enjoys exceptional facilities for trading in the interior, and whilst it could not very well be used as a selling organization for a large and competitive group of British manufacturers, it could be used as a parent company from which workable selling concerns could be organized. The company, under its charter, has the right 'To finance, manage, undertake or participate in industrial and commercial enterprises of all kinds. To act as intermediaries or agents for the purchase or sale of securities, and for commercial and industrial business of all kinds. To deal in and hold stocks and bonds of all kinds.' It will be seen that many practical schemes can be evolved from such a charter, and now is the moment to re-open the question with the Chinese government."

* * *

Both of the above communications help to throw light on the present tendency of the machinery market in China. As pointed out by *The Times* correspondent, "*the name of a maker means little to Chinese purchasers, who know nothing of machinery.*" For the reason that that they have absolutely no conception of modern mechanical appliances, and there is no way to convey an impression of what they are for in their own language, engineering advertising in Chinese is practically worthless. For many years we printed all advertisements in Chinese in a supplement for circulation in China. We employed the very best translators and the supplement was printed at the very best native press in China. Difficult as it is to translate foreign mechanical words into Chinese or even give them a Chinese meaning, once done, it is impossible to translate them back into intelligent English. Many manufacturers had these advertisements translated back into English by some student or linguist in England and America, and in some instances insisted on having them withdrawn. The same situation still prevails and we come back to the statement that successful engineering publicity in China and in other parts of Asia, can only be assured through the use of English, which enables the manufacturer to reach the foreign-educated Chinese, who, at least, has some idea of what the advertising is about. When to this class, is added the foreign-educated Chinese engineer, the limit has been reached in successful engineering publicity.

Foreign manufacturers who followed an intelligent publicity program in China, have been rewarded by an enormous increase in Chinese business. These methods, combined with political conditions which drew the Chinese towards Americans during and immediately after the war, were reflected in the trade returns, which show that they furnished 54 per cent. of the business in 1920. As a contrast to the complaints of the British, the report of Mr. W. H. Rastall, chief of the industrial machinery division of the U. S. department of commerce, traces the influence of political conditions on this trade, and shows the growth in value of the American connection. Since this report was written, there has been a considerable falling off in machinery imports, and such business as is now doing, is going largely to German firms with inside connections with the Chinese. This situation goes to emphasize that sentiment has no place in the Chinese make-up when it comes to business, any more than it has in any other country, and that the trade will gravitate towards the nation whose firms

can quote the lowest price and give the longest terms of payment. The failure of the Chinese to pay for much of the material ordered two and three years ago, from American firms, must be considered in connection with Mr. Rastall's report. It is also worth while to point out that many of the American firms who entered the field in 1919-20, and to whose activities are due to a large extent, the piling up of these orders, have since retired from the field, Americans have almost returned to pre-war conditions in the representation of machinery manufacturers in this market.

Mr. Rastall's report also emphasizes a situation that we invited attention to two years ago, in which a large share of the machinery shipments imported into China and credited to Japan, originates in the United States. Branches of over sixty of the largest Japanese concerns in New York buying direct from the American manufacturer for consignment to Japan where it is transhipped to China, creates a trade situation that must be reflected in figures of direct trade between the United States and China. Mr. Rastall says:

"The progress made by American machinery manufacturers in developing export business and the superior position of American engineering equipment in the markets of the world are shown very plainly by the experience in China since 1911, as is illustrated very forcibly by the tables published herewith. It should be noted that these data are from Chinese and not American sources, being developed from the returns of the Chinese maritime customs.

"Conditions in China have differed radically from those in the other markets of the world because business there has been influenced very strongly by political forces, as has been called to public notice in connection with the armament conference. It has been customary to specify in loan agreements that the machinery required shall be purchased in the country furnishing the money, with the result that the United States supplied China only about 30 per cent. of the machinery it imported in 1918, as compared with 80 per cent. supplied in the same year to Japan, which is and has long been an openly competitive market. Consequently it should be recognized that the progress indicated below has been made in spite of the difficulties encountered by those who sell machinery in China without financial assistance.

"The customs authorities in China always credit consignments to the last port of shipment, so that machinery built in the United States and shipped to China via Vancouver would be credited as from Canada. In recent years very important amounts of machinery have been shipped in that way, in fact, practically all of the machinery leaving Canada originated south of the boundary. Similarly, it should be remembered that the shipments from 'other countries' include not only machinery from Germany, but important shipments from Holland, Belgium, Sweden and other sources, although in the period prior to 1914 Germany was the most important of these sources of supply. The progress made shows a most astonishing increase in the volume of this business, making it worth while to submit the following figures showing the value of the shipments of the leading countries. These values are given in haikwan taels, the exchange value of which fluctuates very seriously, being worth about 65 cents in 1911, $1.03 in 1917, etc.:—

Value in Haikwan Taels of Machinery Imports into China (excluding Agricultural, Embroidery, Knitting and Sewing Machinery.)

Year	United States and Canada *Taels*	United Kingdom *Taels*	Japan *Taels*	Total from all sources *Taels*
1911	382,054	2,330,209	465,122	6,561,020
1912	179,803	1,762,916	388,475	4,704,485
1913	673,227	3,241,590	548,522	7,137,048
1914	681,170	3,749,149	852,934	8,157,270
1915	659,722	1,994,518	851,185	4,485,867
1916	1,078,530	2,350,903	1,991,031	6,131,258
1917	1,411,141	1,648,869	2,419,813	5,982,715
1918	2,390,332	1,313,604	3,569,909	7,860,290
1919	6,407,727	2,073,968	3,604,905	14,328,249
1920	12,181,382	5,229,026	3,727,604	22,536,254

"From the foregoing table it is evident that American machinery exports to China have increased 3,100 per cent. since 1911, and the American share of this business has increased from 5.8 per cent. (the lowest of the countries here mentioned) in 1911 to 54.1 per cent., or more than all others combined in 1920.

"Even this statement does not adequately describe the situation, because American machinery transhipped in Japan, especially for point in North China and Manchuria, is credited to Japan in the returns given in the table. Unfortunately, it is not possible to submit figures to show the volume of this transhipment business, but there is reason to believe it is very large, and during the war was strongly influenced by the demand in Siberia for war equipment.

"What has just been stated refers to the experience covering all classes of machinery. If it is desired to be more specific, it is possible to submit corresponding charts regarding particular classes of machinery and a record of Chinese imports of textile machinery. For Americans the interesting part of the table is the comparison between the experience of the United States and the United Kingdom in this trade. The superiority of American engineering as represented by cotton-mill design and cotton-mill equipment has been clearly recognized in China, as also certain other countries, and it is anticipated that European designs will soon incorporate certain American features. The values involved in this trade are as follows:

Value in Haikwan Taels of Textile Machinery Imports into China.

Year	United States and Canada *Taels*	United Kingdom *Taels*	Japan *Taels*	Total from all countries *Taels*
1911	7,161	241,234	60,159	331,582
1912	9,885	307,283	50,229	458,615
1913	2,615	672,150	112,500	839,724
1914	2,530	1,540,100	187,661	2,038,460
1915	15,446	1,076,229	253,490	1,419,511
1916	115,431	1,257,961	531,437	1,934,141
1917	218,928	669,649	302,607	1,235,800
1918	379,867	669,402	642,948	1,714,994
1919	1,944,350	813,254	897,760	3,767,406
1920	3,897,204	1,925,696	1,071,201	6,927,728

"It is thus very clear that the textile industry in China is growing very rapidly, and the American interest in the trade is making even more rapid progress."

* * *

Up to Northcliffe

THE *North-China Daily News* has an uncanny habit of unearthing documents disclosing the inner working of Russian policy in Asia. Many years ago it set the chancelleries of the world agog by publishing the text of the Cassini convention, a document which changed the whole aspect of Asiatic politics and compelled Great Britain to move quickly in order to defend her interests in India and elsewhere in Asia. The aftermath of this convention and its corrolary, the Li-Lobanoff secret alliance between China and Russia, was the Anglo-Japanese alliance, the Russo-Japanese war and the series of events which culminated in the twenty-one demands followed by the diplomatic blunders which nearly precipitated war between Japan and the United States.

Once again our contemporary publishes an epoch-making document, purporting to be the full text of the secret military convention between Soviet Russia and Republican Germany. As in the case of the Cassini convention, the authenticity of the document is in doubt, but it bears the earmarks of truth. In the event of its authenticity being established, history will undoubtedly repeat itself and Great Britain again make quick moves to counteract it, and unless we are greatly mistaken, the first of these will be a renewal of her discarded understanding with Japan.

By the terms of this secret agreement, Germany will equip, arm and entirely reorganize the Russian army. The German general staff will furnish the red army with the latest inventions in poison gas warfare, will build and equip new munitions and

aircraft factories, *and the reds are not to interfere with the work of German officers and specialists on the new munitions factories on the border of Afghanistan.*

No competent observer can fail to see that the reported secret convention is the logical aftermath of the Soviet's first surrender to Germany, and is strictly in line with the news that has dribbled out of both countries for the past three years.

History is being made while we write about it. It is safe to predict that the time is not far distant when those who were so active in discrediting Japan and bringing about the cancellation of the Anglo-Japanese alliance, will acknowledge the error of their ways. The Russo-Germanic pact leaves nothing to the imagination. It is now pertinent to ask : What will China be doing while Germany is building munitions factories on the borders of Afghanistan and developing the mineral wealth of the Altais and the Pamirs ? What guaranty can China give to Great Britain that her territories in Tibet will not be violated when the time arrives for this new combination to place its plans in operation ? Will the armies of Wu Pei-fu or some other Chinese general step into the breach and hold the new combination in check ? When the time arrives, will those who defamed Japan, call upon her to come to the rescue ?

The time may not be far distant when there will have to be a showdown on these matters. It is hardly probable that Northcliffe favors the new Russo-Germanic combine, and might tell us frankly how he expects British interests in Asia to be protected.

What is Japan supposed to do during the development of this new game of empire ? Is Northcliffe willing to admit the danger to British interests in India, Persia and elsewhere in Asia ? Will he frankly acknowledge that China is powerless to protect even her own integrity ? Then he must be equally honest in expressing views about the necessity of Japan maintaining an army sufficient at least to guaranty her own independence. And if, in the development of the Russo-Germanic program in Central Asia, Britain's position in India and Persia is again menaced from the north, perhaps Northcliffe will be equally frank and honest in explaining just how big an army Japan will then be justified in maintaining ?

Secretary Hughes has very firmly placed on record the American attitude towards the Soviet. The position of France accords with that of the United States. If the time ever arrives when Great Britain is placed with her back against the wall, there will be little sympathy wasted on those who by isolating Japan made possible such a calamity. The force of public opinion has influenced Japan to withdraw her forces from China and the Asiatic mainland. It may be a most difficult matter to persuade her to again set her legions in motion.

If this new alliance works out as they plan, there will be no combination capable of holding it in check except the Anglo-Saxons acting in concert with France and Japan. To quote the *Rochester Post Express,* "the next few years may see the government at Washington converted to the policy of permitting and encouraging the Japanese to occupy and hold Eastern Siberia against the German-Slav colossus and keep it out of China until that country is unified and able to defend itself." And the first to acquiesce in and urge such a policy will be those who have most active these past few years in discrediting Japan.

* * *

A big financial corporation has been organized by nearly forty leading companies of Germany, with the official approval and sanction of the central Soviet administration in Moscow, for the development of Russian industries. The capital of the corporation is temporarily fixed at one milliard gold marks, but it will be increased considerably in accordance with the commercial and industrial requirements of the vast Russian Soviet republic.

* * *

A remarkable organization for the promotion of German enterprise in Siberia has been created by the constitution, which is reported to have taken place at Vladivostok at the beginning of February, of the Far Eastern Russian-German economic association at the premises of the local chamber of trade and industry.

According to the details furnished by the promoters to the Vladivostok court of registration, the object of the association is to promote economic relations between German and Russian commercial and industrial circles, to establish regular business relations, and pave the way towards the productive combination of capital. It is proposed to establish exhibitions of samples of merchandise, prepare and extend lists of responsible firms, collect statistical data, give information of all kinds, endeavor to secure the re-introduction of patents and trade-marks, settle disputes, etc.

* * *

The American Minister

IT was only natural that the clear-headed practical statesmen directing the present administration should live up to the standards set at home and select for the Peking post, a man worthy of the best traditions of the American diplomatic service. Seven years of futile sentimentalism, of batting around from pillar to post, of trying to accomplish the impossible, brought about a serious breakdown of American diplomacy in the Far East. The task of re-shaping American policy in this part of the world was one calculated to test the highest statesmenship of the nation.

Harding and Hughes rose to the occasion. The selection of Wood as governor-general of the Philippines, Warren as ambassador to Tokyo and Schurman for the Peking post, carried the promise that the days of sentiment had passed. With these three trained executives on the ground advising and collaborating with Washington, the president and secretary of state were enabled to re-shape American policies without sacrificing their essentials, and bring about a peaceful and satisfactory solution to the Pacific problems at the Washington conference. The days of hammering out and forming policies for action at the legations are gone. The tail no longer wags the dog. We have returned to the rational system of having national policies laid down by the state department and of appointing representatives who can be trusted with carrying them out for the ultimate benefit of purely American interests.

Jacob Gould Schurman is proving himself equal to the task he is expected to perform and has earned not only the commendation of Americans in China but the appreciation and good-will of the Chinese and his colleagues in the diplomatic corps. In swinging around the circle, visiting all the consular districts in China and gathering a first-hand knowledge of the problems that confront American trade, the American minister to Peking has equipped himself for real efficiency in his job. Americans feel that once again they have a champion whose opinions are not influenced by advisers in Peking working to have their own pet schemes given a monopoly of official support. In the short space of one year, the influence of the new minister has worked a marvellous change, and Americans throughout China are being brought together in a spirit of harmonious co-operation for the general advancement of national interests, a situation that seemed impossible of achievement two years ago under the partisan, and at times, arbitrary methods permitted under the past administration.

It is not our purpose at this time to write a eulogy of Minister Schurman. His reputation as a diplomat and statesman rests on a more secure foundation than his short tenure of office at Peking, where the first job he and his superiors had to tackle was the difficult one of finding a way out of the Oriental political labyrinth into which we had been led and abandoned by others. We are out of it at last, thanks to our new guides. The policies of the former incumbent of the post had so effectively closed the door against independent American financial activities in the development of China, that the only way we could participate at all was through international co-operation. The last administration created the new consortium in order to divert attention

Hon. JACOB GOULD SCHURMAN
American Minister to China
From a Sketch by Joel Madsen

from its own mistakes. It will tax the genius of the present administration to make it work.

Much has been accomplished since the new administration started in to straighten out the Far Eastern tangle. We are once more out of the woods and our feet planted on firm ground. Our guides have proven their worth, and we can look forward with greater confidence that these same leaders will find some way out of the consortium tangle that will once more elevate American diplomacy to its old time practical efficiency.

* * *

The New Pacific "Entente Cordiale"

THE finest accomplishment of the present administration is the four-power pact. Signs are not wanting that the results of the Washington conference and the present trend of world politics will bind America and Japan more firmly together as time goes on. The Russo-Germanic combination is certain to have its effect upon the vital interests of Japan, and whatever differences of opinion may have strained American-Japanese relations in the past, these will disappear and Americans once more unite to morally and materially support the plucky island empire in whatever steps it may deem necessary to take in order to defend itself against such a formidable menace. Only good can come from such understandings, and these are being facilitated by such visits as that of the U.S. naval class of 1881 to Japan to hold their annual re-union as the guest of Admiral Uriu, a member of that class.

These visits will do more to restore good-feeling between the two nations that the usual exchange of high-flown oratory on the part of politicians. Much of the ill-feeling engendered between Japan and America was the direct outgrowth of agitation by politicians for political purposes. When soldiers and sailors, the fighting men of nations, get together in friendly re-union, it is a difficult matter for the politicians to start trouble. Men who to do the actual fighting are more likely to appreciate each other's qualities and become friends than political antagonists who use each other for selfish advancement. A few months since, General Tanaka visited General Wood at Manila. In return for the honors and decorations conferred upon General Wood and his party when they visited Tokyo, the American government conferred the distinguished service medal upon General Tanaka, to be presented while he was in Manila. The medal failed to arrive in time, and in making the formal presentation, General Wood explained the situation and taking off his own medal, pinned it on the breast of General Tanaka, saying that when the one intended for him arrived he would wear it himself. This delicate compliment did more to bring about friendly relations than years of official diplomatic correspondence. Tanaka returned to Japan enthusiastic about his reception and eulogistic in his praises of Wood. Tanaka says that Wood will be the next president of the United States.

In line with this fine feeling of comradeship, is the invitation of Admiral Uriu of the Japanese navy to his fellow-members of the class of 1881 at the Annapolis Naval Academy, to visit Japan this summer as guests of the Japanese government at a re-union in Tokyo. The cordial relations that are bound to follow will be far-reaching. If the fighting men of Japan and America occupy themselves with the relations between their two countries, their influence will neutralize that of professional agitators and trouble-makers, who, in both countries, have been far too active in recent years.

Nothing expresses American sentiment more clearly than the message of President Harding sent through the state department to the America-Japan Society on the occasion of the dinner at Tokyo in honor of the Japanese delegates to the Washington conference.

In commenting on this *The New York Times* says :

"The Japanese delegates acquitted themselves handsomely at Washington and enhanced the prestige of their country. They had made thorough preparation to discuss the articles of the agenda. They brought with them a well-informed staff of specialists. Feeling themselves suspected of Oriental dissimulation to gain their ends, they disarmed criticism by frankness and by moderation. There was a dignity in their demeanor that commanded respect.

"No delegation showed more tact than the Japanese, and their courtesy was proof against misapprehension. It was their custom not to commit themselves without notice that Tokyo had been consulted. At all times they were scrupulous to be understood, and when they took a position, as when they made a stand for the warship *Mutsu*, they were ready to agree to compensations. In short, the ability and discretion of the Japanese were a revelation to their critics. So it is just as well as courteous that Secretary Hughes should have said for the president in the message to the America-Japan Society which was honoring Prince Tokugawa and his associates :

> Highly appreciative of the great interest taken by these gentlemen in the success of the conference, the president would wish that he be permitted to share in the occasion by making through me his own acknowledgement of their sympathetic co-operation and of the considerate and accommodating spirit with which they participated in the many difficult questions confronting the conference.

"Previous to the Washington conference, talk of an *entente cordiale* with Japan would have had a ring of insincerity, but the spirit and the success of that historic meeting have brought about an improvement in the relations of the two nations."

* * *

The China Trade Act

A Nigger in the Woodpile ?

THE honorary secretary of the American chamber of commerce of China has been retained in Washington for sixteen months by the American business community of Shanghai for the purpose of pushing through the act providing for federal incorporation of American companies operating in China. Shortly after his return to Shanghai, the following editorial appeared in the *Weekly Review of The Far East*, of which the honorary secretary of the American chamber of commerce of China is editor and publisher :—

"American business in China has developed very rapidly since the beginning of the European war and, in some instances, has suffered from over expansion to such an extent that the present depression is causing embarrassment in many quarters. There have been elements of competition which have served to injure the whole American business position in this great overseas market. Every experienced American business man in China knows that the failure or withdrawal of one American firm of promise from this field not only injures the individual firm affected, but all American business in this part of the world. It is a matter of common knowledge that unfair competitive practices on the part of one firm injures not only those in the lines affected, but also all other lines of American business. Fraudulent practices on the part of one firm injures all, and worse, tends to bring all American business both domestic and foreign into disrepute in the eyes of other nationals. Competition for the trade of China is becoming keener and is tending to become national rather than individual. It is not our intention to advocate a trust, for this would be impossible of organization or operation, but all will agree that there should be co-operation and co-ordination. That, at least, would remove the worst features of destructive competition. Some may suggest that this work of co-ordination should be handled by certain American govermental organs represented in the field, but this is difficult of accomplishment under the American democratic system, and would eventually cause congressional criticism. The job should be handled by the American business and financial interests themselves through some form of organization that would tend to eliminate objectionable features of competition without repressing individual initiative and effort. We admit that it would be a real job to bring this about, but there is always the right man for the job providing the place is made sufficiently attractive. After the right man has been found, he should be able to prove his worth and the general saving which he would be able to bring about would make his salary a mere incident, even though it reached the magnitude of that received by Mr. Hayes from the movie interests."

We can be excused for wondering what all this was leading up to. It was interesting to speculate upon the personality of this representative of non-competitive American business interests who would reside in Washington and practically dictate American policy in China. The casual reference to the salary of Mr. Hayes, the head of the movie trust (a mere bagatelle of $150,000) opened our eyes to the possibilities of such a job and we have waited for further enlightenment on this brand-new idea. When the honorary secretary of the American chamber of commerce of China, made a speech before the American chamber of commerce at Tientsin, we were still puzzled to understand the meaning of the following statement :—

"There is not a soul in congress to plead the interests of business men in this part of the world. It would be worth many times the cost to have such a man on hand in Washington to represent American interests out here. Some of the wildest arguments are advanced in congress

about products from China and there is no one on the ground to dispute them. For example, one congressman made a long speech about disease in products from China. He built up a fine structure of argument based entirely on bunk. Interests having millions at stake in these matters have absolutely no one to represent them in Washington."

We scented a nigger in the wood-pile, and waited to see just how and where the Etheopian gentleman would show himself.

At the annual meeting of the American chamber of commerce for China its honorary secretary read a *résumé* of the amended Act as it would pass both houses and be signed by the president. Amongst other clauses was one which read *"that at least one director of a China trade act corporation must reside in the district of Columbia!"*

Examination of the act discloses that the "number, qualifications and manner of choosing and fixing the tenure of office and compensation of all directors of these China trade act corporations shall be fixed in the by-laws of the corporations themselves. In other words, each company may fix its own qualifications for directors, and with the law providing that one director shall reside in the district of Columbia, it means that the usual qualifications surrounding the election of directors will have to be materially modified. Naturally, no one company could afford to maintain a director resident in the district of Columbia, so if the law is to be complied with, several or many companies would have to combine to pay the salary and office expenses of such representation.

As matters stand, there are few individual American companies in China who could legitimately bear the expense of complying with this clause in the new law but it might not be difficult to follow the hint conveyed in the editorial appearing in the *Weekly Review of the Far East* and organize a group of non-competitive interests which could pay an interlocking director a salary commensurate with that received by the head of the movie trust. Granted that this can be done within the law, how about the outsider, the competitor who attempts to buck this combination with its $150,000 a year director resident in Washington? Is this what the honorary secretary of the American chamber of commerce means when he advocates removing the worst features of destructive competition? Might not the elimination of objectionable competition include newspapers? We don't know how this phase of the clause appeals to other American firms in China, but we fully understand how the system might work in connection with our own business.

It would seem that hidden away in this clause of the China trade act lurks a fat job for one or two representatives of American trade interests resident in Washington, who would wield immense power, which could be employed very effectively against objectionable competitors.

There may be no connection between the editorial in *The Weekly Review of the Far East*, the speech of the honorary secretary of the American chamber of commerce at Tientsin and the clause in the China trade act providing for a resident director in the district of Columbia. It is difficult, however, to dissociate one from the other.

It is quite conceivable that such a plum will never be handed out to any ordinary individual, much less any American resident in China. It will be a big job and will go to some legal light whose knowledge of China is nil but whose political prestige in Washington is great. The China trade act provides that all corporations organized under its provisions may sue or be sued in the supreme court of the district of Columbia, thus making the director resident in Washington, for all legal purposes, a head officer of the corporatiou he represents. Naturally, such a personage cannot be bothered with details. He will require expert advice and guidance. The real head of the combination will be an assistant having a most intimate knowledge of the inside working of American business in China.

The main features of the China trade act will materially advance American interests in China. It should be enacted into law. The clause providing for resident directors in the District of Columbia, however, opens the door to the creation of a favored combination whose power can be exerted to crush or stifle competition. With a full knowledge of how such power can be used, THE FAR EASTERN REVIEW will watch with considerable interest the working out of a clause which facilitates such un-American practices.

* * *

The Situation in China

CHINA has passed through its seventh revolution in ten years, and from out of the wreckage emerges Wu Pei-fu as the new military dictator of Peking. A traitor in the army of Chang Tso-lin gave the initial victory to the forces of Wu in the north and the betrayal of Sun Yat-sen in the south gives the finishing touch to a campaign which elevates Wu to the top-most rung of the Chinese military ladder. Wu declares that his great aim is the unification of the country, the abolition of the *tuchunate*, to put an end to internal strife and the destruction of property and bring China back to the ways of peace. His praises have been sung daily by a chorus of Peking correspondents, and the world educated to look upon Wu, as the "Hope of China."

"The Hope," however, seems to be only one more in a band of *tuchuns* who have openly robbed the government and people for their own ends. Wu Pei-fu followed the precedent of Chang Hsun, but has been luckier than Chang in that he was early impressed with the value of publicity and of having a number of foreign writers on his staff of advisers. When Wu placed his army astride the Peking-Hankow Railway at Chengchow and exacted toll frcm its revenues and collected the salt taxes, in the same manner as Chang Hsun straddled the Tientsin-Pukow line at Hsuchowfu in earlier days, he was exonerated by the claque, because, as they explained, his intentions were good. Wu, they said, was a real patriot, resorting to these illegal methods only because the wicked government at Peking refused to supply him with funds. Wu was, therefore, justified in maintaining his army in order to drive the rascals out. The end justified the means.

Now Wu Pei-fu may be all that his press agents would have us to believe him to be, and if he can live up to the reputation set for him by admirers and maintain his ascendency, the chances seem bright for the rebirth of a benevolent military dictatorship on the lines of the one created by Yuan Shih-kai.

However, notwithstanding the reports of brilliant victories and the serene confidence of the small cheerful circle surrounding General Wu Pei-fu, it is becoming more and more evident that peace and unification are as far off as ever. From all accounts, Chang Tso-lin is still to be reckoned with, and as long as he sits tight in Manchuria there is little hope that the power of Wu Pei-fu will materially change the situation. Instead of being dictated to, Chang Tso-lin is in the position of dictating to Peking. Chang has advanced an argument difficult to ignore. When he talks about self-determination of the Manchurian provinces he is in a position from which he can only be moved by force of arms. His army is more or less intact and his financial resources remain as sound as ever. While Peking is at its wits' end seeking funds, Chang still has his group of Manchurian banks which can provide him with $50,000,000 when necessary. Wu has proven himself a good soldier, but his ability as a statesman and administrator remains to be tested. His own party is split asunder and the members of the parliament swarming into Peking are reviving the tactics of other days, and seem determined to have things their own way in regard to posts and emoluments. It is entirely too early to assume that China is out of the woods, despite the optimistic statements of the small cheerful circle which surrounds General Wu and whose reports constitute the basis of most of the current news articles emanating from Paotingfu.

It is difficult to ignore current reports that Wu Pei-fu has the support of this or that legation, and that the ground is all prepared for the issuance of a great refunding loan, which, amongst other things, will consolidate his power in the same manner

that the reorganization loan of 1913 seated Yuan Shih-kai firmly in the dictatorial saddle. Such a loan might accomplish this end, but it would not consolidate China.

Until such time as a proper constitutional government based on a recognition of provincial rights and a limitation of the central authority is established, dictators will come and go and the nation or nations who finances any one military overlord, will learn to their sorrow that they have backed the wrong horse. The mere fact that

North-China Daily News

Wu Pei-fu, drawn by Juel Madsen

any one dictator is supposed to have the support of any particular foreign government is sufficient to set all other interests intriguing for his downfall. A *régime* which starts in by hounding out of China the two brainiest financial leaders of the country, who, no matter what their faults may be are true to type, no better or worse than their accusers, and which eliminates Sun Yat-sen by base treachery, cannot hope to inspire full confidence in its ability to perpetuate itself. If unification is ever to come to China, it cannot be made permanent by ignoring the man who stands for ideals which lie at the very foundation of successful constitutional government in this country. Nor can the Chinese nation be unified by the use of the armies of any one *tuchun*, super, ordinary or otherwise.

Had Chang Tso-lin emerged victor from the fight in Chihli, he might have staggered along for a few months or a year under the charge of being in the employ of Japan. Wu Pei-fu may last as long or longer, but if current stories have any basis in fact, he also, in the end, will have to go. When any one foreign minister or financier cherishes the illusion that the dictator of China is safely tucked away in his vest pocket, that particular dictator's tenure of power will be short indeed.

The Chinese have milked the foreign financial cow dry. Japan has been milked for many millions, If reports are true, Uncle Sam has also contributed $50,000,000, which cannot be collected. Indications now point strongly to the intention of Peking to bestow its affections upon the British. It may be true and it may be false, but whether true or false, the Chinese will learn that there will be no altruism in any loan obtained directly or indirectly from British sources. The money, if lent, will be expended for the purposes for which it is intended, carefully supervised, and audited and the revenues for its security safely earmarked against any possible attack of aphasia on the part of future officials. Loans from England have their advantages. They are certain to be productive and create markets for materials.

"Playing Uncle Sam for Sucker"

This phase of the Chinese situation leads up to a brief reference to the series of articles entitled "Playing Uncle Sam for a Sucker" now appearing in *The Weekly Review of the Far East*. In this indictment of China, stress is laid upon the failure to pay her legitimate debts to American manufacturers for materials delivered, while making every effort to satisfy Japanese and European creditors.

There is only one observation we care to make on the situation described in the columns of *The Review of the Far East*, and that is, if the Chinese are playing Americans for suckers, the responsibility must be shared in large part by Mr. J. B. Powell and his co-workers, who, under the leadership of ex-minister Reinsch, started the campaign to flood the Chinese field with American firms in order to skim off the cream while the skimming was good during the Japanese boycott, and to build up an American business community in China whose mere weight of numbers would swing business to American manufacturers. We had occasion last year to invite attention to the disastrous consequences of this hip-hip-hurrah! method of advancing national interests in China, and to quote the commissioner of customs who officially declared in his annual report that the influx of a large number of inexperienced foreign firms into Shanghai precipitated the catastrophe which nearly ruined every trading firm in this port. American firms cannot be held responsible for responding to the official propaganda to induce them to enter the field.

Some time last year Mr. Guy W. Walker, a most rabid anti-Japanese propagandist, proposed to President Harding in a letter which we commented upon at the time (July, 1921) that the United States government take over all of China's bonded indebtedness to other powers in payment of an equal amount of what the allies owed to America. In other words, the United States was urged to become the sole creditor of China after which we were to question the validity of loans made by Japan and denounced as inimical to China's interests.

This proposition was very properly ignored, yet during the progress of the Washington conference it was again revived, this time by Mr. Thomas F. Millard. The newspaper comments on this scheme constituted the only reference to Mr. Millard's activities during the conference. It is difficult to dissociate Mr. Millard from the publication which still bears his name. It is appropriate, therefore, to invite attention to a scheme, which, if ever carried out, will place the United States in the position of being the biggest sucker that ever existed. If China is not promptly meeting her obligations to American creditors, who is to blame, the Chinese, or the people who led them to believe that Americans would fight their battles for them and relieve them of all financial indebtedness to other powers.

The Chinese are making it difficult enough for Americans to support their policies and create a sentiment favorable to the flotation of any loan on the American market for their financial relief. They certainly are not playing the game as Americans understand it, but they have the right to feel peeved when the Millard Publishing Company accuses them of playing Uncle Sam for a sucker after having led them to believe that the United States government

might be induced to manipulate a deal which would relieve them of all outside financial indebtedness.

Japanese-American Co-operation

As mentioned above, constant propaganda has created the impression that in some way or other, not fully explained, the British group in the consortium will either take the initiative in negotiating a refunding loan or operate independently in financially supporting the Wu Pei-fu *régime*. It has been difficult to reconcile these reports with the consortium understanding, and, if true, would indicate that the British group was prepared to go it alone. There is nothing to prevent such a loan, if the other groups decline to participate. We have refused to give credence to these reports believing they were simply expressions of wishes that were father to the thought, proof in our mind that Peking had come to the end of its financial rope, and was now endeavoring through subtle propaganda to create dissentions amongst the banking groups that would lead to a cancellation of the consortium agreement.

The situation seems to be that China can expect no assistance in the shape of independent loans from Japan. The Japanese are not likely to play the financial fool for the sake of bolstering up any temporary dictator in Peking. The Chinese have exhausted their credit in Japan. Over $50,000,000 are owed by China to American firms, and those who have reposed the blindest faith in her honor are hit the hardest. We quote from *The Wall Street Journal* of November 4, 1919, when the original Continental and Commercial Trust Company loan to Peking was placed on the market for renewal. Mr. J. J. Abbott in an interview given out in Chicago, said :

"I would trust China without any security, but it has been the custom of that country to supply such protection."

Coincident with the above declaration of absolute faith in China's financial honor, Dr. Paul S. Reinsch arrived in the United States to enter upon his duties as chief adviser to the Chinese government. In one of his first interviews on arrival at San Francisco as reported by the Associated Press on October 23, 1919, he declared :

"And remember, that China is one of the very few big powers which is absolutely solvent and can pay for what she buys with spot cash if she so desires."

Can American business men be censured for taking these leaders of finance and diplomacy at their word ? Is it any wonder that the warning of lesser lights was ignored when such propaganda was put out to induce Americans to "invest in China" and get aboard the band-wagon that was then being paraded up and down the cities of the United States, heralded by a brass band of newspaper publicity, such as was never given to Barnum in his palmiest days ?

At the time, we strongly denounced such broad statements, calculated to unduly enhance the credit of a government existing solely for the purpose of finding funds to perpetuate the rule of rapacious *tuchuns*. Over two years have passed. Mr. Abbott's loan came up for payment in November last. The interest and principal was defaulted. Manufacturers of railway and other materials accepted Minister Reinsch's declarations at their face value and eagerly booked orders the Chinese forced upon them. They are now whistling for their money. The pendulum has swung the other way. China's credit in the United States stands below zero.

Business conditions in China are worse than ever. In commenting on this phase of the situation *The North-China Daily News* says :

"Merchants of wide experience in Shanghai make no secret of their opinion that not even in the strenuous days of the revolution did matters come to such a pass as at present. Ships arrive in port bringing valuable cargoes, but the Chinese dealers who act as the purveyors for the interior are unable to put their cargoes into consumption. They must be warehoused here or elsewhere, eating up money through interest charges and perpetuating the dislocation of trade. No ray of light appears to penetrate through the gloom, nor will there be until Peking effects such a settlement as will promote confidence sufficient to trade on.

So much for the needs of private business. The business in which the government itself is interested deserves equal consideration from those consulting on affairs of state, for in different parts of the world manufacturers and engineers must be paying unusual attention to Peking's capacity, or lack of it, for ordinary business affairs. The contract for the Yellow River Bridge was awarded a considerable time ago, and since then nothing has happened. A firm in Europe was recently given the work of constructing a number of locomotives for government railways, and progress has now been made thereon to the point where the first instalment of money can be called for. An unhappy rumor is current in the capital that it is not forthcoming. Only the other day the contracts for the Peking tramways were announced, but people regard the whole project sceptically : in the present condition of things they believe the trams are hardly likely to be seen for many a long day."

With the financial markets of Japan and America barred against independent Chinese loans, it was only natural that the latter should start a flirtation with the British. But the British many ages ago graduated from the kindergarten class in these international financial matters, and while they may smell around, nibble and investigate, they are too wise to swallow the hook and be landed in the Chinese net. If there is any sucker to be caught, it will not be hooked in the Thames.

Present conditions indicate, that sooner or later, the Chinese must come to the consortium for relief. If, however, current reports should prove true, and British money is loaned to Peking directly or indirectly, it is not very difficult to prophecy the future.

It is preposterous to harbor the idea so carefully propagated, that the British will come to the financial rescue of Wu Pei-fu, but if the incredible should come to pass, a similar unbelievable situation would surely follow. Japan and America would be brought together in a co-operation so harmonious that it would materially change the entire situation in the Far East.

* * *

Keeping Peace on the Pacific

Cheap Radio Essential

ELSEWHERE in this number of THE FAR EASTERN REVIEW will be found articles dealing with the Pacific radio situation and the growth of radio activities in Japan. Since the first article was written we learn that the service of the U. S. naval radio for press dispatches is to be continued until July, 1925. It seems unfortunate that this service to the Pacific press cannot be made permanent, as the commercial cable and radio rates between Pacific countries are prohibitive to the sending of any press dispatches save those of the most sensational character. We agree with the Pan-Pacific union that a six-cent a word press rate to any part of the Pacific via government radio would have meant the assurance of continual goodwill, which for the next ten years, is a guarantee of permanent peace in the Pacific.

Spurred on in part by these low radio rates, the United Press is entering the Pacific field and hopes to loop up a news service between all Pacific lands. Unburdened by any contracts with European press services to keep out of any Pacific territory the United Press has a free hand. It is understood that a drop service will be established at Honolulu where it is proposed to gather and disseminate radio press messages from and to every part of the Pacific.

With so much money being expended in the United States to keep the people amused and informed by free radio broadcasting, it would seem that some attention might be given to a service upon which depends to such a great extent, American trade and prestige in the Pacific.

The United States government from its army and naval radio stations sets free daily wonderful musical compositions that anyone, amateur or professional, may receive and listen to if he but has a wireless outfit or access to a receiver connected with one.

The U. S. government serves the press of the American Pacific with news sent out through its naval raio stations at a minimum cost. Should the other governments of the Pacific be willing to

reciprocate, a six-cent a word press rate could and would be established between any two countries of the Pacific. Such a press rate now exists between San Francisco, Honolulu, Hawaii, Tonga, Samoa, Unalaska, Alaska, Guam and Manila. The result was that Honolulu on the most isolated group of islands in the world, received and published daily the full proceedings of the great conference in Washington. There was no misunderstanding.

Japan, China and Australasia refused to receive the radio press messages distributed by America, with the result that often dispatches during the conference were days late in transmission and on several occasions so garbled as to almost bring about international misunderstanding.

From Washington it cost six cents a word or less to get news to Honolulu or Manila. It cost from thirty to sixty cents a word, press rate, to get news to Japan, China or Australasia, and this was practically a deferred rate, subject to a delay of twenty-four hours or more. It cost triple commercial rates, or from one to three dollars a word to get quick cable service to the Orient or Australasia.

At Guam when six cents a word press messages were received, these might be relayed by government radio to Manila, but the messages destined for Japan had to be taken by auto across the island to the Japanese cable office to go over a congested cable.

It was hoped that during the Washington conference all this would be adjusted, and at one time there seemed to be every hope that it would be. Now it is necessary for the Japanese and American ambassadors to get together and suggest an amendment to our treaties that will permit Japan to receive and send press messages to and from her government radio stations.

It is because of these unfortunate restrictions on the free and unhampered distribution of news between Pacific lands that the Pan-Pacific union of Honolulu is urging that each government send a delegate to the next conference who is well posted on communications. As it is now only sensational items are sent at the present high and all but prohibitive press rates that exist because of the lack of understanding and co-operation.

The Pan-Pacific union believes that the governments of the Pacific can safely be trusted to set free daily authentic news of the happenings in their respective countries. At any rate this subject might well come up for expert discussion at the Pan-Pacific commercial conference next October.

Here is a proposition that should meet with the nnqualified approval of every American in China and Japan, the assurance that through cheap communications for press publicity friendly relations may be perpetuated with all Pacific countries. If millions can be expended for amusement and advertisement at home, some attention ought to be given to the more serious needs of trade and future relatons with China and Japan. It is to be hoped that the branches of the Pan-Pacific unions in China and Japan, the American chambers of commerce and other bodies will get behind Alexander Ford at Honolulu and work for the success of such a worthy program.

For a Better Consular Service

ACTIVITIES of the diplomatic and consular services in behalf of American business interests were described by Secretary of State Hughes, in an address at the concluding session of the annual convention of the chambers of commerce.

The state department and the department of commerce, Mr. Hughes said, are co-operating in their activities in a most satisfactory manner.

"I shall make no apologies for asking not only your support but your active and urgent demand in the interest of American business for the maintenance and development of the most efficient organization of our diplomatic agencies," said Mr. Hughes. "The truth is that our foreign service is undermanned and underpaid. Of course, in the department of state, as in other departments, we are most deeply interested in economy and reduction of unnecessary expense. At this time with vast burdens resting upon our people as a result of the war, all avoidable outlays should be rigorously cut down and the department of state has done its full share. Let me call attention to the fact that the expenses of the entire service of the department, including the diplomatic and consular services and that of the department in Washington amount to less than $11,000,000. Indeed, under the present schedule of passport fees, which I shall be glad to see revised and reduced, for the last fiscal year the receipts of the department exceeded the total expenditures of all services by over $1,270,000. In other words, it was a money-making institution. I am not, therefore, asking outlays which threaten the taxpayer with any serious increase of his heavy burden. A relatively small amount would be sufficient to give the equipment that is needed to provide the essential basis of a career and thus to keep trained men in the service of the government.

Diplomacy and Commerce

"There has long been too great a distinction between the political interests of the diplomatic service and the commercial interests of the consular service. Both are engaged in political work and both are engaged in commercial work. You cannot at this time take economics out of diplomacy. If you would protect your interests on the one side you must support them on the other, and I believe that the two branches of the service, now called the diplomatic and consular, should be drawn together and treated as an interchangeable unit. This would permit men to be assigned from one service to the other and thus give a greater range of opportunity for putting men in the places where they belong, as their aptitudes and special talents are revealed.

"In all these matters we must be realistic and not permit our mental processes to be stopped by archaic differentiation. Nearly all nations have found it necessary to make a considerable reorganization in order better to equip their foreign service, and this country should not lag behind.

"There should be a co-ordination of effort among the different departments of government. Sometimes it might be supposed that the different departments of government were so many different governments, such has been at times the nature of the intercourse between them. While we are intent upon perfecting any particular agency of government we can never afford to lose sight of the fact that it is a single government whose varied instrumentalities we are considering and which must act as a single government with a unified purpose and method.

Departments Co-operating

"I am glad to say that we are achieving at this time a very gratifying measure of co-operation among the departments; in particular the relations between the department of state and the department of commerce are most cordial and mutually helpful. We are working with each other and endeavoring each to aid the other in its recognized field of effort. It is my most earnest desire that all practicable measures shall be taken to promote American commerce and disseminate through all appropriate channels the essential information which the American merchant needs.

"The department of state is carrying the flag of the twentieth century. It aims to be responsible in its own essential sphere to what it recognizes as the imperative demands of American business. It aims at the co-ordination of the work of all departments bearing upon the same great object of American prosperity. It intends in its contacts with foreign governments to maintain the American tradition of candor and good faith and at this difficult time it is earnestly desirous of aiding in the re-establishment of stable conditions and thus of contributing to the welfare of other peoples upon which our own prosperity must ultimately depend."

Keeping Peace on the Pacific

Protest Against a Radio Monopoly

ONE of the most vital requisites to permanent peace and good understanding on the Pacific is a cheap and efficient news-service, either by cable or radio. Pending the establishment of adequate commercial radio facilities, it devolves upon the American and Japanese governments to permit the use of their naval and other official radio stations for the transmission of news matter at the lowest possible rates consistent with good service. This is, perhaps, one of the most important questions before the newspapermen of both countries to-day, for unless some such practical solution is found, American newspapers will have to depend to a large extent on British sources for news from the Far East. Americans should have their news of the day from this part of the world presented to them without coloring or editing from the many special pleaders and propagandists who in most cases monopolize the sending of Far Eastern news. Peace with understanding is dependent upon the outcome. If the results of the Washington conference are to be permanent; if the Pacific Ocean is to remain true to its name, the next ten years must witness a complete *rapprochement* between Japan and America, with a more intimate knowledge of Chinese and other Far Eastern problems. Not only is this essential for promoting peace and goodwill, but for the proper development of trade.

That energetic organ of American newspaperdom, *The Editor and Publisher*, has been conducting a strenuous fight for the passage of a bill that will extend for five years the use of the American naval radio facilities in the Pacific for news dispatches. The opposition forces are taking the stand that the government is being placed in the position of competing with private industry, but in refutation of this, it has been pointed out that unless the naval radio is used the service will have to be discontinued, so in view of this fact there could be no competition.

Another argument of the opposition is that set forth by the Radio Corporation of America, which contends that a five-year extension will seriously interfere with its marketing of securities to raise funds with which it says it plans to extend its facilities. Representatives of the corporation told the senate naval affairs committee that they were not opposed to a two-year extension, but they claimed if congress authorized a longer period, it would interfere with their plans. They could give no assurance that they would be prepared to handle the press business in two years, but said that if they were not, they would not oppose a further two-year extension. They could not, however, give any assurance as to the rates that would be charged. And in this connection, attention has been directed to the fact that the Radio Corporation of America would have a monopoly on the business and could charge whatever it desired.

The campaign of the American editors has been indorsed in a petition signed by the leading newspapers and news agencies of Japan for presentation to the Minister of Communications, requesting that the Japanese navy radio be utilized to permit news transmission at a low rate per word. Attention is called in the document to the rate of a few cents charged between New York and European cities, and that rate contrasted with press rates of 27 cents for wireless and 32 cents for cable dispatches in effect between San Francisco and Tokyo. "If the present situation is not improved," the petition declares, "the result will be harmful to the interests both of Japan and America."

Underwood and Underwood

OWEN D. YOUNG

Vice-president of the General Electric Company, who, at the instigation of Admiral Bullard, conducted the negotiations which put American commercial radio entirely in American hands.—*World's Work*

There is every reason to believe that the project aimed at lower trans-Pacific press rates will be successful. The Japanese government is known to be willing to grant the use of its naval radio facilities. An agreement which exists between the ministry of communications and the Radio Corporation of America ostensibly would prevent the use of government stations for this purpose but, in view of the fact that the service given the newspapers would be temporary and intended only to bridge over the period until increased facilities permit the private companies to handle news dispatches at a reasonable rate, the Radio Corporation is expected to give its consent. This company's business in Japan is conducted through the imperial government telegraph bureau and the ministry of communications, and statements already issued by officials in these departments indicate that the Radio Corporation's agreement will not be an obstacle to the proposed co-operative arrangement.

In view of the importance of this measure for the advancement of international friendship, it would seem that some compromise might be effected along lines that would not unduly interfere with the success of the Radio Corporation in marketing its securities. On the other hand, there is every good reason why editors and publishers should oppose any plan that might ultimately lead to the practical monopoly of any company in the transmission of Pacific news. What the nations of the Pacific need, and need quickly, is cheap communication, to break down prejudices and racial ill feeling. We have ten years to work in before the expiration of the

period of naval limitation. If the Radio Corporation of America cannot give the assurance needed at this time as to when it will be able to take over commercial business at reasonable rates, then it would seem that the higher interests of the nations and peoples concerned demand that the extension of the use of the American naval radio for cheap newspaper messages be granted by congress. The cause of peace and good understanding should not be made subserviant to the requirements of private capital, no matter how worthy and patriotic their motives. In this one matter of cheap press dispatches, it is clearly up to the governments of the United States and Japan to leave no stone unturned, to stop at no cost, in order to complete the first great step towards mutual understanding resulting from the Washington conference.

* * *

No comment on the radio situation in the Pacific would be complete or just without some reference to the great work already accomplished by the Radio Corporation of America for the advancement of nation interests. In this, the credit goes largely to an admiral in the navy and his assistant in charge of naval communications. We cannot do better than reprint the editorial from *World's Work* which reveals for the first time something of the activities of these two naval officers which broke the European radio monopoly and permitted an American company to enter the field.

Rear-Admiral William H. G. Bullard of the United States navy and his assistant, Commander S. C. Hooper, performed a very valuable service to the United States of which people have heard little. As a people we are accustomed to expecting much from the army and navy without special reward, and curiously enough the traditions of those services are such that we commonly get what we expect.

Admiral Bullard's case is a very good example. It was owing to this officer's energy and foresight in doing more than his duty that the United States now has, in American hands, the most effective radio communication of any nation.

With the exception of Marconi, almost all the great names in radio, Fessenden, de Forest, Squier, Pupin, Armstrong, etc., are Americans, yet by 1919 British commercial enterprise and finance had secured a dominant position in radio communication all over the world. As British enterprise had done the same with cable communication, an American invention, the United States was largely dependent upon British companies for its communication with the rest of the world. As late as the beginning of 1919 the Marconi companies were dominant in the radio field all over the world. There were several Marconi companies including an American one, but the British Marconi Company controlled them all. In building up their business the Marconi companies were negotiating with the General Electric Company for some high-speed alternating current machines for sending, designed by Mr. Alexanderson, one of the engineers of that company. The negotiations had been interrupted by the war. During the war the General Electric Company, being unable to find a market for these machines. had set up two of them at its own expense as a demonstration at the New Brunswick station of the American Marconi Company.

Underwood and Underwood

REAR-ADMIRAL WILLIAM H. G. BULLARD

Whose visit to the offices of the General Electric Company on April 5, 1919, began the sequence of events which ended in American control of commercial radio in this country and in the dominance of the American interest in the South American field.—*World's Work*

This station had proved particularly effective when taken over and operated by the navy, Admiral Bullard being then chief of communications. The war being over early in 1919 the negotiations were again in progress with the Marconi Company, and all but settled when Admiral Bullard got back from Paris.

On April 4, 1919, Mr. Owen Young, vice-president of the General Electric Company, got a telegram from Admiral Bullard asking him not to sign the agreement with the Marconi Company until the admiral had a chance to see him. The next day the admiral and Commander Hooper reached New York. The admiral urged the General Electric Company as a patriotic American concern not to sell its apparatus to foreign companies and thereby impair the possibility of forming a strong enough American company to meet foreign competition.

An American Company

It was pointed out to him that the General Electric Company had spent a great deal of money on this apparatus, that it was a manufacturing company, not a radio company, that it could sell to the Associated Marconi Companies and that there was practically no other customer. But that did not discourage the admiral. He persuaded the General Electric Company to have the courage of this convictions and to try to form an American radio company and sell its apparatus there. He promised to try to get for such a company, government support; and he did try and nearly succeeded.

However, by this time the General Electric Company had gotten a firm hold on the admiral's convictions and proceeded regardless of the failure to get government support. The first essential was to get control of the American Marconi Company. Mr. Young went to England and persuaded the British company to sell its interests and to make satisfactory traffic arrangements with the new American concern. Likewise the French Marconi Company agreed to sell the Tuckerton, L. I., station to the Radio of America, as the new company was called. By these negotiations the Radio Corporation came into possession of all the high powered sending stations in the United States except the government stations, and had, moreover, favorable traffic arrangements with the companies in Europe.

Then the problem was to develop the facilities both commercially and technically as rapidly as possible. To this end Mr. Young sought the aid of the American Telephone and Telegraph

Company which, beside its great experience in selling communication, had also done a great amount of investigating in the radio field. An arrangement was made whereby the Telegraph Company and its manufacturing subsidiary, the Western Electric, made all their patents and investigations available to the General Electric Company and for use by the Radio Corporation ; and in return the General Electric made all its patents and devices available for the Western Electric and the Telephone Company, it being agreed that the Radio Corporation should not use these licences in the telephone field and the Telephone Company should not use the licences it received in the commercial field except where it supplemented the telephone system.

Backing of Strong Firms

So at the instigation of an admiral in the navy an American radio company came into being, and under the management of Mr. Young it acquired the backing not only of the General Electric Company but of the Telephone Company as well, and later the Westinghouse Company made its patents and devices available for the Radio Corporation also.

On April 4, 1919, the Radio Corporation existed only in the brain of Admiral Bullard. On December 1, 1919, it was ready for business. On March 1, 1920, it received the stations from the hands of the government. It is now the largest and best equipped commercial radio company in the world, is American run and American owned, and provides the United States with American-controlled communication with the rest of the world. There are now five circuits—to Great Britain, to Norway, to Germany, to France and across the Pacific.

Radio Development in Japan

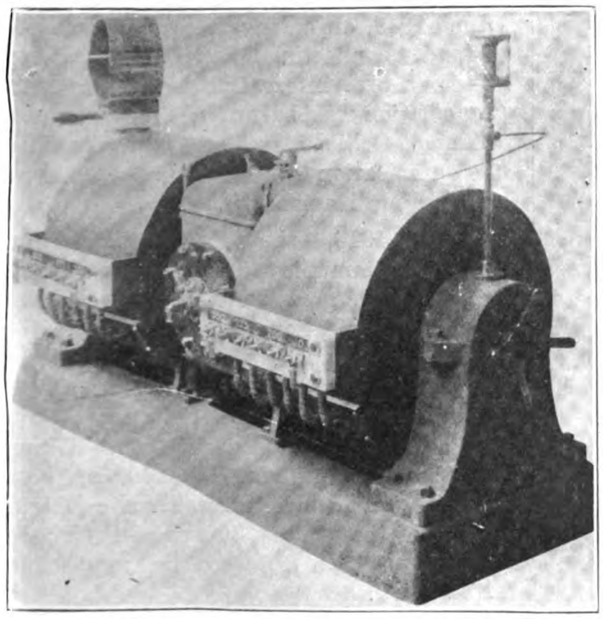
H. C. Huggins

IN 1897 Japan first learned of the successful results of Marconi's experiments with wireless communication, and stimulated by this, the department of communications at once began an experimental study of radio, quite independent of the Marconi inventions. Details of the Marconi experiments were kept a profound secret, and under the circumstances the department found it extremely difficult to manufacture the necessary apparatus. By the summer of 1897, however, the department of communications had succeeded to such an extent that experimental communication between Tsukishima and Shinagawa, a suburb of Tokyo, were successfully carried on.

Ever since 1897 the Japanese government departments have been engaged in profound researches into wireless problems, and great progress has been made, despite the fact that all use of radio has been jealously monopolized by the government, and independent investigation has not been permitted until recently.

In 1900, communication between Tsudanuma and Yahata, some 10 nautical miles was opened, and at the same time two stations at Yawata, Kazusa province, and Otsu, Sagami province, 29 miles apart, were successfully operated. Thereafter from Funabashi, Shimosa province, to Otsu, Sagami province, 34 nautical miles, communication was effected and regularly maintained.

The technique of the department's system improved every year, and is now known in Japan as the "Teishinsho" (the system of the department of communications). In 1903, in fact, wireless communication, using the "Teishinsho" system, was opened between Nagasaki and Formosa, 630 nautical miles, proving that the Japanese system is as practical as any of the others now in use throughout the world.



Arc Generator made by the Nippon Radio Company

Some of the inventions which have made the "Teishinsho" system a success are listed in the following table :—

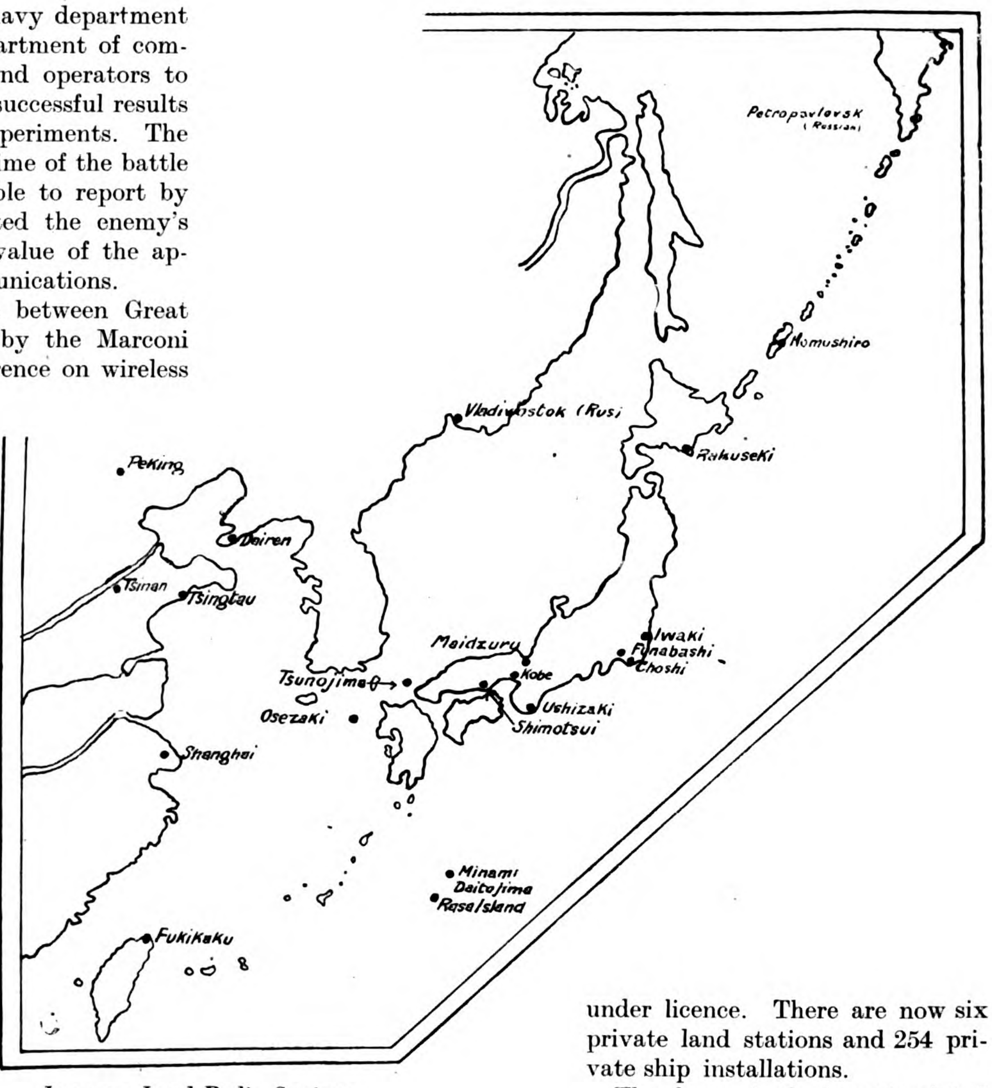
Name of Invention	Year Granted	Inventor
Radio wave detector	..Dec. 16, 1904	Osuke Asano
Radio wave detector	..March 19, 1907	Mitsuru Sayeki
Radio sending system	..Oct. 7, 1907	,, ,,
Tantalum detector	..Oct. 21, 1908	Yuichi Torigata
Receiver mineral detector	..Dec. 8, 1908	,, ,,
Sharp cone mineral detector	May 18, 1909	,, ,, and Eitaro Yokoyama
Radio telegraph and telephone receiver ..	..June 3, 1909	Mitsuru Sayeki
Extra high-tension dry condenser	..July 22, 1909	,, ,,
Radio detector for telegraph and telephone ..	..July 22, 1909	,, ,,
Wave detector for wireless telegraphy ..	..Sept. 8, 1910	,, ,,
Radio sending and receiving apparatus.. ..	..Aug. 22, 1910	Yuichi Torigata
Enamel covered condenser	..Nov. 24, 1911	,, ,,
Quenched spark gap for wireless telegraph and telephone	..Feb. 10, 1913	Mitsuru Sayeki and Kumanosuke Koyama
Sound proof arrangement for spark discharge ..	..Dec. 12, 1913	Mitsuru Sayeki and Yoshio Yoshida
Simultaneous sending and receiving apparatus for radio telephone and telegraph	..Dec. 17, 1913	Eitaro Yokoyama
Current intensifying arrangement for spark discharge	..Sept. 13, 1918	Mitsuru Sayeki, Yoshio Yoshida and Kumanosuke Koyama
Multiplex telephone and telegraph wire for radio	..March 8, 1920	Yuichi Torigata, Masujiro Kitamura, Noboru Maruke, Teijiro Horie and Eigoro Tsunobu
High frequency telephone and telegraph apparatus	..April 14, 1920	Same inventors as above
Wave sending apparatus for radio telegraphy ..	..March 2, 1920	Masujiro Kitamura

During these early years of experiment the navy department realizing the value of wireless, requested the department of communications to lend some of its experimenters and operators to the navy, so that it might take advantage of the successful results of any of the department of communications' experiments. The fact that the sentinal ship *Shinama Maru*, at the time of the battle of Tsushima, in the Russo-Japanese war, was able to report by wireless to Admiral Togo, "We have just sighted the enemy's ships," is one of the historical instances of the value of the application of researches of the department of communications.

In 1903, successful wireless communication between Great Britain and the United States was established by the Marconi system. This led to the first international conference on wireless in Berlin. Japan sent delegates both from the department of communications and the navy department, and subscribed to the articles of the treaty negotiated there. Japan also became a party to the treaty negotiated at London in 1912.

The first wireless stations for the transmission of public messages in Japan, were opened in 1908, at Choshi, Tsunojima, and Ohsesaki; and seven steamers flying the Japanese flag, including the *Tenyo Maru* of the Toyo Kisen Kaisha, and the *Tango Maru*, of the Nippon Yusen Kaisha, installed wireless apparatus that year. Some years later, the station at Choshi, and the new station at Funabashi were regularly broadcasting meteorological observations and time reports.

Since 1908, the number of Japanese merchant vessels carrying wireless has increased to 394, while there are 15 non-military land offices under the jurisdiction of the Japanese government. Among these, the Iwaki station is one of the finest in the world.



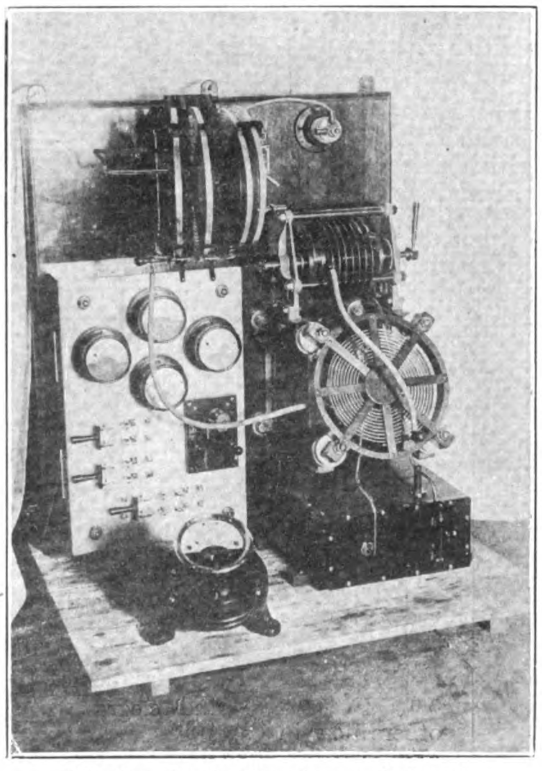
Japanese Land Radio Stations

The Japanese stations now operating keep Japan in direct communication with the United States and Canada, and the coast of Asia.

The United States was the first country to make obligatory the installation of wireless equipment on board steamers. Eventually an international agreement to instal wireless on all passenger ships was reached. Japan, however, was prevented from placing this law in complete operation because of the shortage of apparatus caused by the European war. But during the past few years Japanese companies have taken up the manufacture of wireless apparatus, and the shortage is being made good by home-made equipment. Consequently the time is not far distant when all Japanese ships will be equipped with wireless.

Naturally, Japan lacks competent operators. In order to remedy this, the department of communications has laid down rules for the examination of candidates for licences which permit private schools to train students as radio operators on Japanese vessels.

Up to 1915, the conduct of wireless was regulated by the provisions of the telegraph law. This law was too restrictive in its application to private activities, so in 1915 it was changed, and for the first time, private owners were permitted to establish wireless stations, under licence. There are now six private land stations and 254 private ship installations.

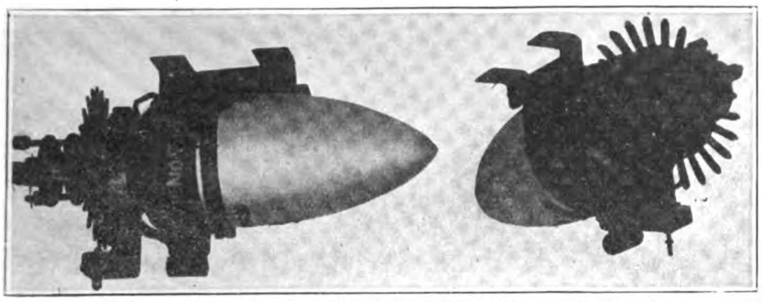

Wireless Set for Trawlers made by the Nippon Electric Company

The change in the law stimulated the organization of companies to manufacture wireless apparatus. The Nippon Musen Denshin Denwa K.K., and the Annaka Denki K.K., were pioneers in this field, which is still restricted to less than ten companies of importance.

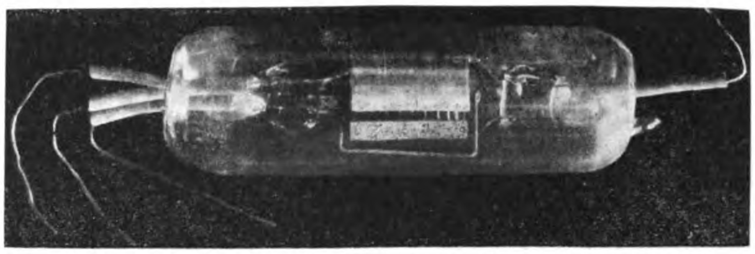
In 1912, during an interruption of the cable service between Japan and Taiwan, wireless service was first established from the main island of Japan and Formosa (Nagasaki is in Kyushu, which is not the main island of Japan). In June 1915, an office was opened on Rasa Island, connecting Japan and Rasa. Japan's first international wireless communication was begun in 1915 when an office at Ochiishi, Hokkaido was placed in communication with another at Petropavlosk, in Kamchatka.

In 1916, the Funabashi station opened communication with Hawaii, and this proved a great assistance in establishing communications between the United States and Japan. With the completion of the Tomioka receiving station at the Iwaki office, in May, 1920, a double line of communication with the United States was opened. Its area of communication includes Hawaii, the Pacific coast of the United States and Canada, and connection can even be made with New York.

Following the example of the rest of the world, Japan's engineers have



Sending Apparatus for Aeroplane Wireless made by the Nippon Radio Company



Vacuum Tube made by Nippon Radio Company

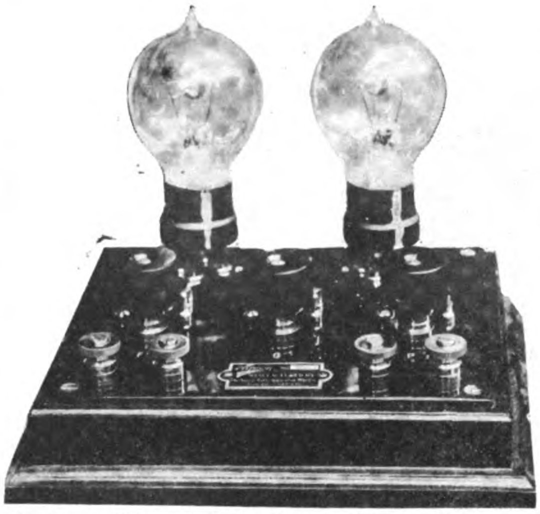
been busily engaged in wireless experiments, in an endeavor to perfect a system for long-distance communication. The Haranomachi station which will soon be completed will embody the latest of the improvements made by the Japanese engineers.

The navy department is carrying on research work at the Tsukiji naval arsenal, in Tokyo. In the early days of navy experiment the ordinary spark system was used. Just before the European war the quenched spark system was adopted, but now the undamped system, the arc system and the generator system are also the object of navy research. The navy operates the Funabashi station, and has almost completed another station in Taiwan, which is as large as the Funabashi station.

The chief experimenters in the navy department are Dr. Tsutomu Minohara, Mr. Tatsuo Matsuda, Mr. Kazue Hattori, Mr. Katsuuki Nishizaki and Mr. Genyo Osawa.

The Army

Up to the time of the European war the Japanese army had done nothing to speak of in developing wireless communication for military purposes. But during the war a section of that department was devoted to wireless experimentation and a laboratory established at Nakano in Tokyo prefecture. To-day the army department owns the Nakano, Moji, Kanazawa and Otaru stations, and there are other military wireless stations belonging to the army department in China and in Siberia.



Vacuum Tube made by Nippon Radio Company

The army is actively purchasing portable wireless apparatus for army use from foreign countries. It is also developing its own system, because the authorities are unwilling to depend on foreign countries for equipment which might be essential in time of war.

The army department also maintains an aerial communication section, occupied primarily with aeroplane study. But under the direction of French officers, teachers in the aviation school, wireless apparatus has been installed on all aeroplanes under their direction. The apparatus is French, but some parts are of Japanese manufacture. Recently some British officers have been engaged as trainers of the aviation corps and introduced British-made machinery. Great expectations are entertained of the development of the aerial bureau, and with the growth of its operations the use of wireless equipment will expend.

Department of Communications

With the exception of the stations under the direction of the army and navy, Japan's wireless systems are under the control of two bureaux in the department of communications: the bureau of wireless installations and inspection under the direction of Mitsuru Sahegi, and the bureau of wireless research directed by Uichi Torigata.

The bureau of installations and inspection has under its control the great Haranomachi wireless station which has just recently been built with the object of exchanging direct messages with America. This station is a steel concrete tower 600-ft. high, and will be equipped with its 400-kilowatt high frequency, Alexanderson generator. Pending the installation of this generator the station communicates with Hawaii by the arc system.

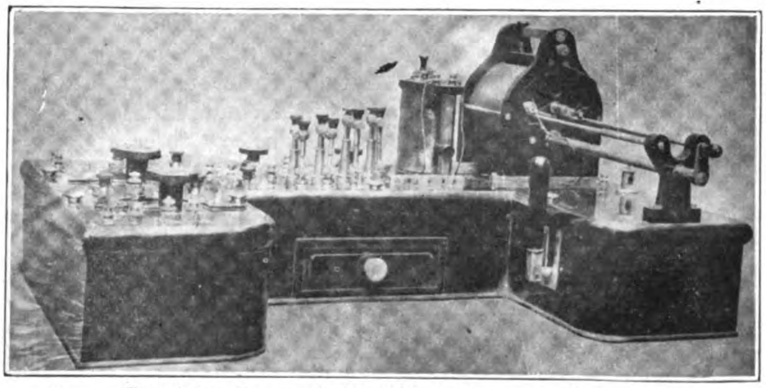
This bureau is also directing the construction of the Peking wireless station, contracted for by the Chinese government with the Mitsui Bussan Kaisha.

The bureau of research has been confining its work to experiments on commercial apparatus. The 'T.Y.K.' wireless telephone apparatus, connecting wireless with ordinary telegraph service, and apparatus which will both send and receive at the same time, have been perfected by this bureau. At present its researches are confined to perfecting wireless telephones.

Only the Haranomachi and the Funabashi stations have been built to handle trans-oceanic communication. Most of the other stations were built to communicate with steamers only.

The policy of the Japanese government is to place all steamship wireless plants under the control of government operators. There are now about 310 installations on Japanese steamships, of which, 50 have government operators. With the extension of wireless the demand for equipment is rising, and Japanese companies are slowly monopolizing the business, their equipment being cheaper and almost as satisfactory as that imported from other countries.

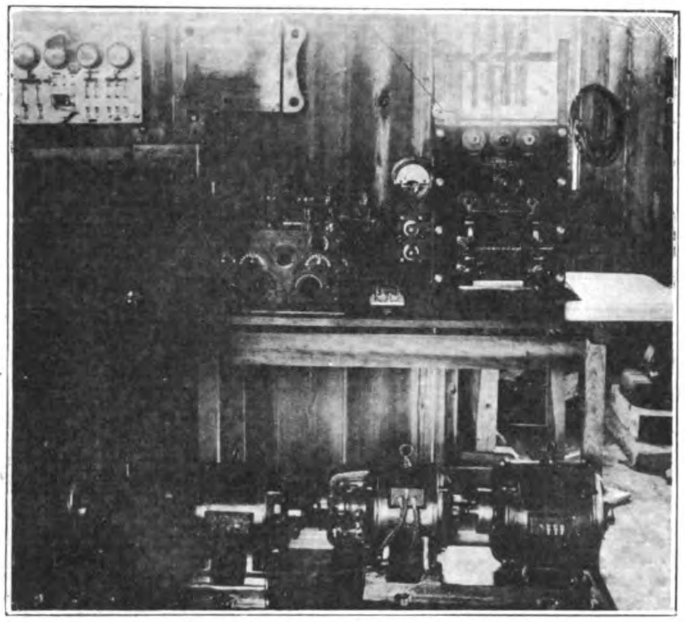
The Nihon Musen Denshin Denwa K.K., is the only company in Japan, which exclusively manufactures wireless apparatus. This company has built several land stations for the different government departments and also manufactures all classes of apparatus used on board ship, such as the car system, vacuum system, wireless telephones and accessories.



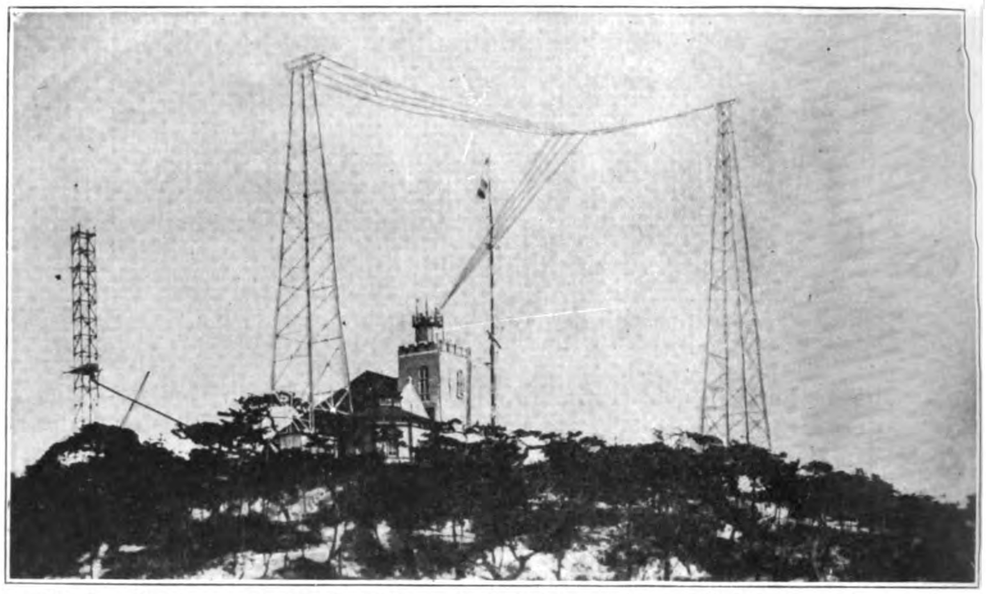
Receiving Set made by Oki & Company, Tokyo

It now erecting and equipping with its own apparatus the Ocean Meteorological Observatory station at Kobe. Two systems will be installed, the arc and the spark. When completed, ships will be furnished with meteorological reports. For the first time in Japan, steel towers of the self-supporting type for the aerial lines are being used.

Trawlers, which are so important to the food supply of Japan



Complete Radio Outfit made by the Imperial Radio Company (Teikoku Musen Denshin K. Kaisha)

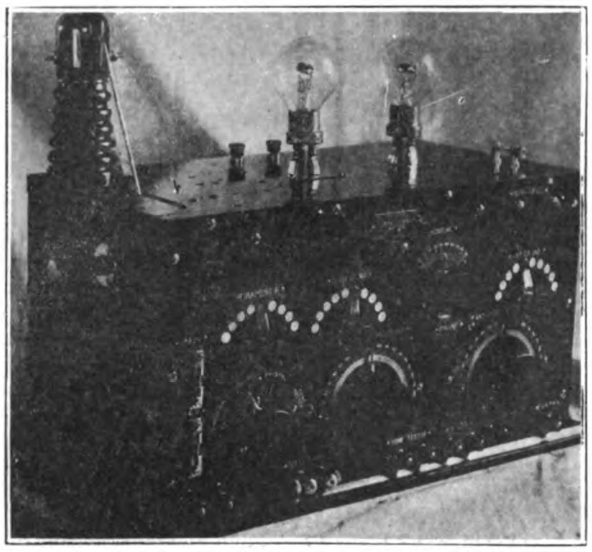


Wireless Station of the Marine Meteorological Observatory, at Kobe, Japan, Erected and Equipped by the Nippon Musen Denshin Denwa Kabushiki Kaisha

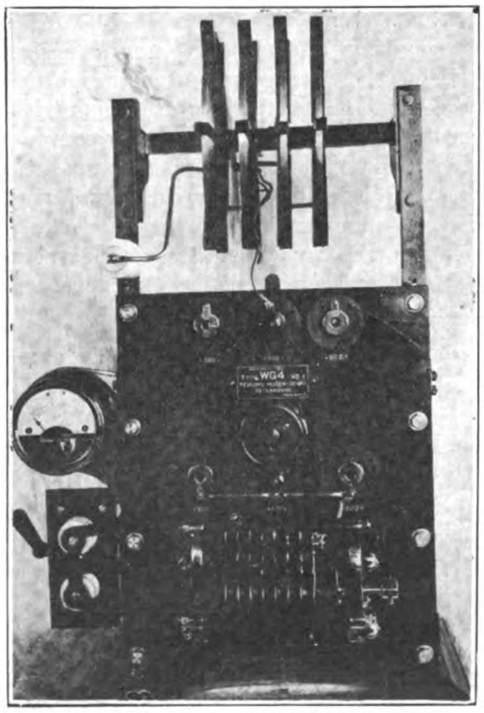
were most irregular in their returns to port, and the market price of fish could never be regulated. The Kyodo Gyogyo K.K., one of the largest fishing companies in Japan, equipped its vessels with wireless apparatus built by the Nihon Musen Benshin Denwa K.K., and as a result has greatly increased its profits by controlling the movements of its vessels.

The capital of the Nihon Musen Denshin Denwa K.K. is Y.1,000,000, one-quarter paid up. Mr. Jukuro Kadono, the principal member of the Business Men's Commission, which has just completed a trip to the United States and Europe, and a director of Okura Co., is president of the company.

In April, 1920, the Teikoku Musen Denki Seisakujo was organized to engage in the manufacture of wireless apparatus. This concern is a subsidiary of



Receiving Set made by the Imperial Radio Company

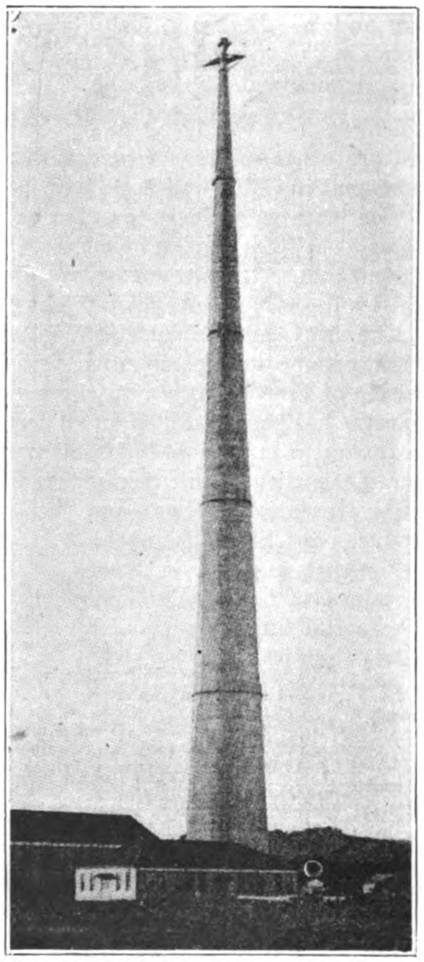


Sending Apparatus made by the Imperial Radio Company

Suzuki & Co., of Kobe. Its manager is Mr. T. Tsujiminato. Its factory has been erected in the town of Kamata, between Yokohama and Tokyo. Its engineering staff is headed by Mr. Hayao Kadooka, an authority in military wireless apparatus. The works are swamped with orders from the army departments.

The Oki Electric Co., Ltd., established in 1881, is the oldest enterprise in Japan engaged in manufacturing telegraph and telephone apparatus. In 1913, it started the manufacture of wireless apparatus and was at once patronized by the governmeut departments. In 1915, when the private wireless act permitted the private use of wireless, this company installed plants in its head and branch offices, using three-kilowatt sets, quenched spark system. In 1918, a vacuum-bulb factory was built by this company, the product equalling in all respects the foreign-made bulbs. In 1919, a workshop to manufacture wireless telegraph and telephone apparatus exclusively for the military departments was constructed on 3,000 *tsubo* of land in the suburbs of Tokyo. The arc convertor which is to be placed in the Ibaraki wireless station is the product of this company. On December 15, 1921, according to the department of communications, there were 811 wireless stations controlled by Japan. Of these 118 were land and the balance 693 were steamship installations.

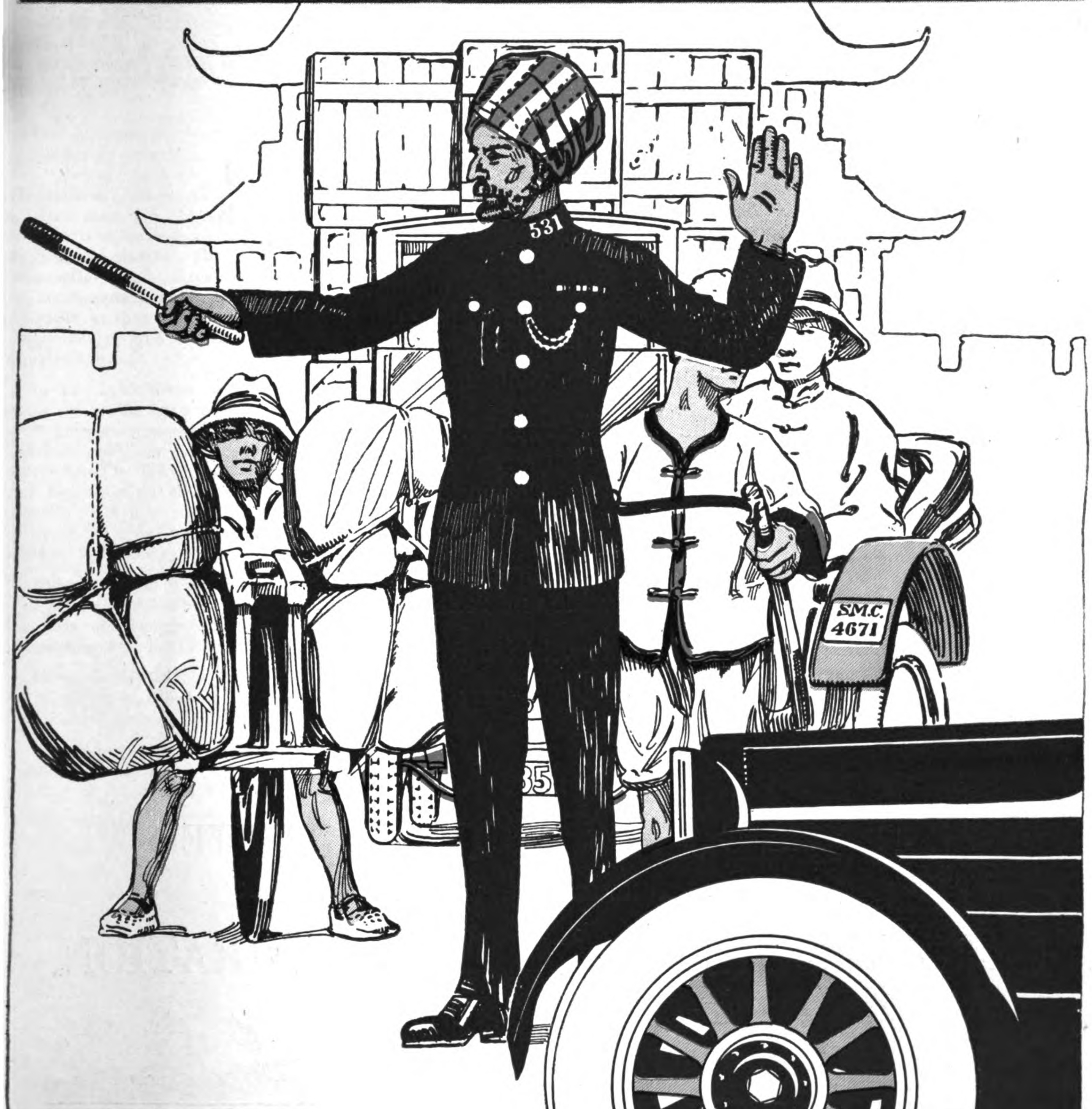
	On Land	At Sea
Military stations ..	19	10
Naval stations ..	20	243
Government, department of communications ..	15	90
Private stations ..	3	394
Research stations, etc.	17	—



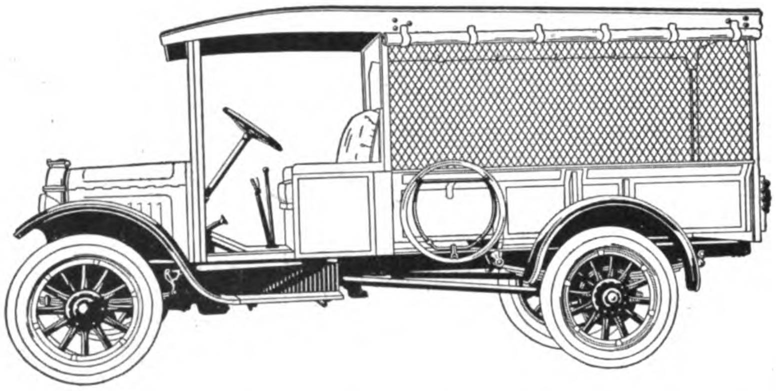
The Hara No Machi Tower Completed

The FAR EASTERN MOTORS

MOTORING - AERONAUTICS - MOTOR BOATING



"UNEQUALLED SERVICE TO THE USER"



REPUBLIC

This light Republic Delivery Van is the latest type of commercial vehicle which fills the demand for quick service and capable of covering a large district.

Built by the largest organization exclusively devoted to the production of commercial vehicles, complete satisfaction is assured from correct design and the finest of materials.

Low first cost plus low operating expense guarantee profitable and reliable service.

There are Republic vehicles for every trade and all purposes.

REPUBLIC

CENTRAL GARAGE COMPANY, LIMITED

9 HONGKONG ROAD, SHANGHAI

REPUBLIC TRUCK SALES CORPORATION

Alma, Michigan, U. S. A.

CABLE ADDRESS: "REPUBLIC"

Taxes, Motors and Roads in Japan

JAPAN is falling into line with the rest of the world in encouraging automotive industries. One of the first steps was to remove the high and discriminatory taxes on motor vehicles which last year were practically prohibitory throughout Japan. In Tokyo, the authorities raised the motor tax by 50 to 80 per cent. The operating costs became excessive and many cars were retired from service. At the time there were 5,000 cars in circulation. Upon promulgation of the law 600 licenses were returned and a like number of cars placed in storage. A major problem of Japan—that of congestion in cities—was made more difficult of solution because of the decrease in modern transportation.

The Japanese government, realizing this error, recently sent an official to the United States to study traffic arrangements. His conclusion was that Japan can solve its problem of congested cities best by encouraging motor vehicle transportation. The removal of discriminatory high taxes is the first step, and the recent action of the Tokyo authorities in that direction may soon be followed by the other prefectures throughout Japan.

Baron Goto, Tokyo's Mayor, who has put through a Yen 40,000,000 Street Improvement Program

In the new Tokyo schedule the biggest reductions have been made in the 20 horsepower class, which includes practically every six cylinder automobile operating in Tokyo. In 1921, the taxes for cars of this class amounted to Y.963.00. The new schedule reduces this by 18 per cent., and the tax now stands at Y. 787.05.

The tax for cars of from 15 to 20 horsepower has been reduced by 10 per cent., in the 10 to 15 horsepower class., 6 per cent., with practically no reduction in the 5 to 10 horsepower class, embracing the majority of the light cars.

The reductions in the 20 horsepower class and over will benefit both motorists and dealers and increase the sales of six cylinder cars which sell at from Y.5,000 to Y.7,000.

The following tables show the new taxes which went into effect last month:—

Private Automobiles and Trucks

	Total Yearly Tax
Over 20 horsepower	Y.787.95
From 15 to 20 horsepower	614.00
From 10 to 15 horsepower	404.79
From 5 to 10 horsepower	244.90
Less than 5 horsepower	139.04

Public Automobiles and Trucks

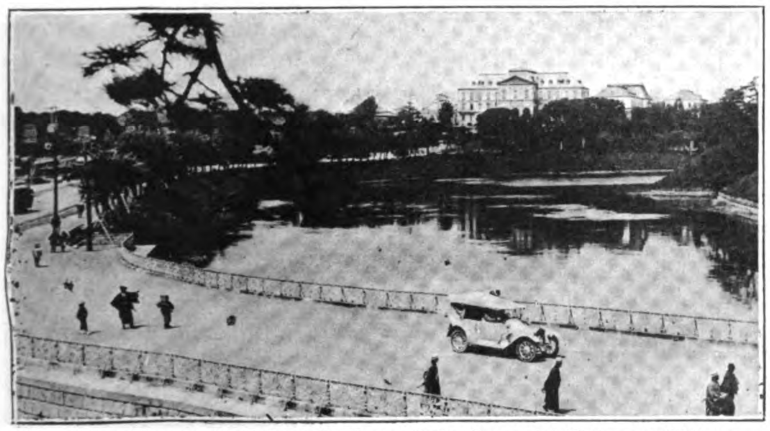
	Total Yearly Tax
Over 20 horsepower	Y.370.80
From 15 to 20 horsepower	264.02
From 10 to 15 horsepower	185.40
From 5 to 10 horsepower	124.00
Less than 5 horsepower	75.84

Notwithstanding these substantial reductions over the taxes levied the preceding year, they are still out of all proportion to these prevailing in other countries and militate against purchases of new cars. Conditions, however, point to a still further reduction that will again make the possession of a motor car desirable and stimulate not only importations but the manufacture of cars in Japan.

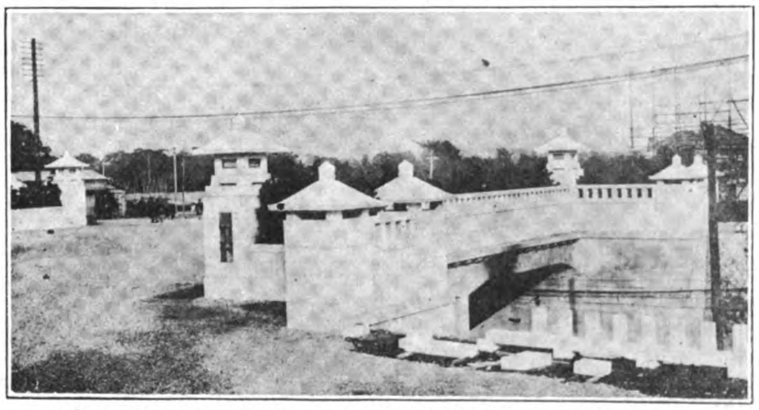
Considerable progress in building and assembling is being made in Japan, and a visit to the Tokyo Peace Exhibition will demonstrate the remarkable advances already made in design and construction by purely Japanese manufacturers. Although some of these cars are merely models and have not as yet been placed on the market, they are evidence of the fact that the Japanese are preparing against the day when a national road system will create a market for home automobiles that the government will be called upon to protect on the usual manner.

Foremost amongst the Japanese exhibitors is the Mitsubishi Company which shows a limousine of their manufacture, modeled on the general lines of the 15 horsepower Fiat model..

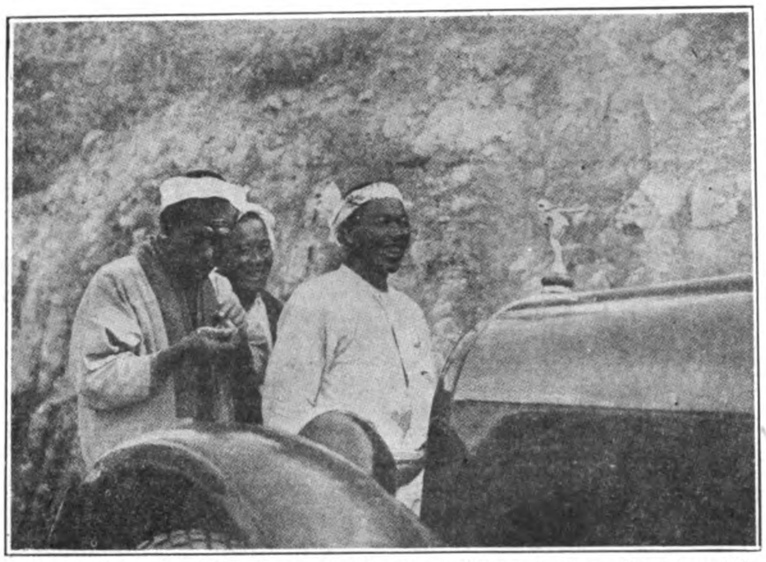
Another interesting Japanese exhibit is the Gorham three wheel light car, manufactured in Osaka. The touring model



Road leading to the Sukurada Gate of the Imperial Palace at Tokyo



One of the New Bridges over the Sunken Railway Tracks in Japan's Capital



What Makes the Wheels—with Goodyear Tires, notice—Go Round? These Japanese coolies, seeing an automobile for th first time, think the "goddess" on the radiator cap is responsible, the man who took the picture says. Anyway, they're enjoying themselves

seats three, one in front and two behind. It is sold at a low price, about the same as that asked for a large two-cylinder motorcycle.

The Hakuyosha Company exhibits the models of two small four-cylinder cars, which will be placed on the market in a few months.

The German S-B electric, a one-passenger car, which is quite popular in Tokyo is also exhibited as a Japanese machine as it is to be made in Japan.

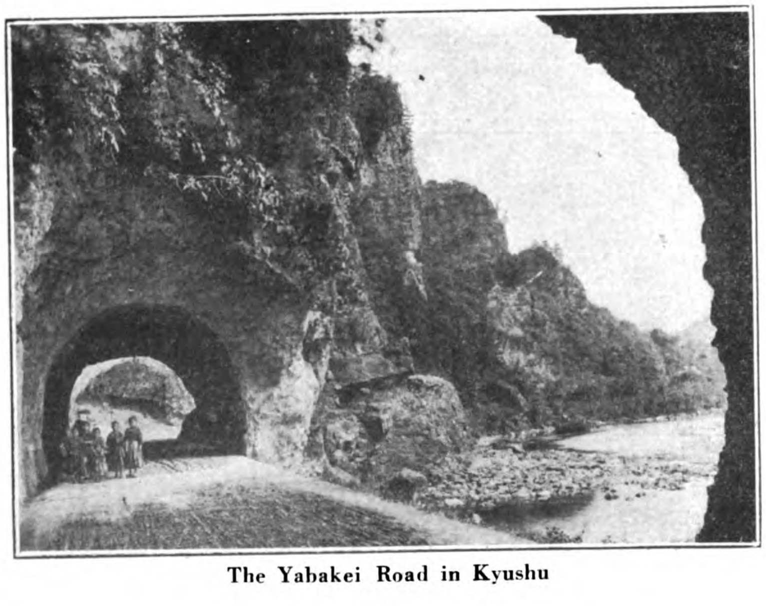
Nosawa & Company exhibit a large Telco limousine electric car, which will also be placed on the market in the near future.

The Tokyo Ishikawajima Company exhibits its Wolsely car which is assembled, mostly from English parts, at its Tokyo plant, under the supervision of English engineers.

If these huge investments in automobile plants in Japan are to bring profitable returns, taxes must be lowered to a point that will not discourage prospective purchasers and roads must be built to facilitate traffic. Tokyo and Osaka are leading the way in street improvements.

Tokio Road Program

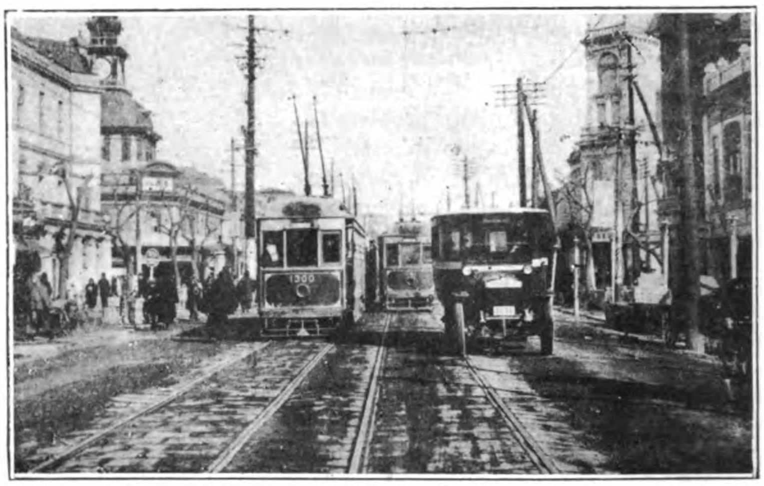
Before fixing upon a definite program, the municipal authorities of Tokyo have been making careful studies of road materials and from 1910 until 1920, 72 paving experiments were carried out enabling the city to determine just what kind of pavement is best suited for Tokyo.



The Yabakei Road in Kyushu

As a result of these experiments a huge program extending over a period of four years has been drawn up and approved by the Municipal authorities.

This provides Y.39,468,000 for new pavements to be completed by 1926 and approximate 275 miles of modern roadway. The streets which are to be paved will be the main thoroughfares, the Ginza being a good example of this work. Stone, wood-blocks and asphalt are to be the principal types new street work. The funds are now available and the home office has signified its willingness to grant five-twelfths of the desired money.



Trams and Motor Buses on the Ginza, Tokyo's Main Artery of Traffic

Asphalt and Road-Making Machinery

Considerable asphalt has been used as surface dressing for Tokyo's macadam and wood-block pavements, and recently an order for 2,000 tons of Trinidad asphalt was placed with the Barber Asphalt Company of Philadelphia, whose representative is now making a tour of Asia investigating the possibilities for asphalt pavements.

As a result of the activity in road building not only in Tokyo but in Osaka and other parts of Japan, considerable business has been done in road-making machinery and dump carts, with the prospect of further large orders in the near future. Here at least is one place in the Far East where modern road-making machinery can find a market, as the extent and character of the program and the limited length of time involved in carrying it out, calls for the employment of up-to-date methods.

Osaka Roads

The city of Osaka will also soon begin an extensive road building program which will extend over a period of ten years and more than 40 million yen will be spent if the plans as proposed by the Osaka city planning commission are accepted and passed by the home department of the national government.

Under the plans as put forward by the city authorities ten main highways radiating from Osaka will be thoroughly made over. The new highways will be of macadam. This investigation has been going on for the last several months with Mayor Ikegami taking a leading part. He is chairman of the city commission. The plans also state that the new roads will be from 48 to 72-ft. in width, this depending upon the amount of traffic which will have to be accommodated. This program is primarily intended to improve the roads in the outlying districts of the city.

According to their announcement the city is also planning to enter upon another program of approximately the same size in rebuilding the city streets of Osaka. This is dependent upon whether or not the first program is accepted by the government. It is planned to carry out the second program in conjunction with the building of the proposed new railway station for Osaka, which is to be the largest in Japan.

Autos and Trucks in Japan

In 1920, 95 per cent. of the number and 93 per cent. of the value of motor vehicles imported into Japan were of American manufacture. Imports from the United States in 1921 declined to 77 per cent. of the total number and 66 per cent. of the value. The following table shows the number and value of automobiles imported, by countries of origin, in 1921 :—

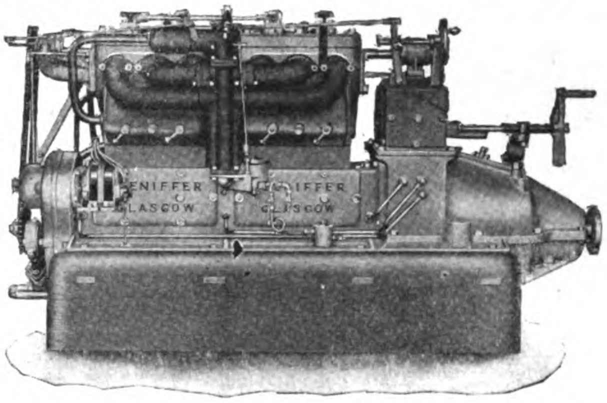
Imports of Motor Vehicles into Japan in 1921.

Countries of Origin.	Number.	Value.
United States	832	$2,160,638
England	75	476,480
France	83	353,432
Italy	46	160,645
Germany	22	32,009
Belgium	4	41,042
Kwantung Province	5	16,006
Canada	6	31,112
Total	1,073	3,271,364

The decline in imports from the United States was especially noticeable in the latter part of 1921, while those from France increased appreciably.

An unofficial investigation as of June, 1921, reported 12,440 cars and trucks in Japan, the number of passenger automobiles being estimated at about 12,000. Approximately 2,550 passenger cars are operated in and around Kobe. There are about 450 trucks in the country, 200 of which are located in the vicinity of Kobe.

GLENIFFER
KEROSENE & PETROL MARINE MOTORS

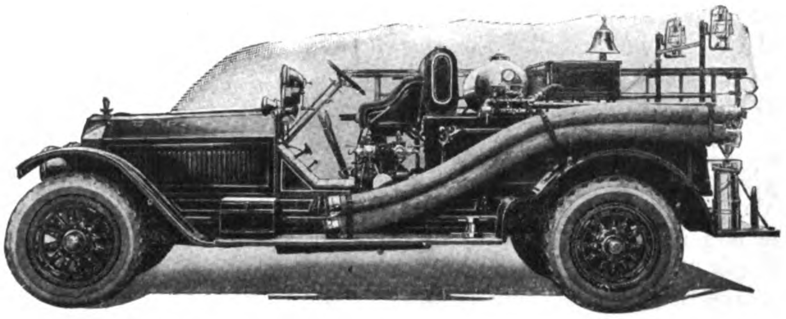


FOR ALL TYPES OF BOATS
RANGE OF MODELS—10 TO 90 H.P.

AGENTS:—Douglas and Grant Ltd.—at Madras, Rangoon, Bangkok, Saigon, and Haiphong.
Ritchie and Bisset—at Singapore.
British and Dutch Engineering Co., Ltd.—at Batavia and Soerabaia.

GLENIFFER MOTORS LTD.
ANNIESLAND, GLASGOW, SCOTLAND.
TELEGRAMS: "GLENGINE, GLASGOW."

AERIAL TRUCKS WATER TOWERS
AMERICAN FIRE ENGINES LA FRANCE
CHEMICAL ENGINES
HAND FIRE EXTINGUISHERS
FOUNDED IN 1845



GET TO THE FIRE—QUICKLY.

No matter whether its a pull over rough city streets or a stiff uphill grind over country roads, American La France Fire Engines are noted in all parts of the world for "being first at the fire."

Every part is built to stand the strain and the motor is powerful. Equipment includes 40 gallon chemical tank, pump, hose body, suction hose, two ladders, axe, crowbar, pike pole, lanterns and two hand extinguishers.

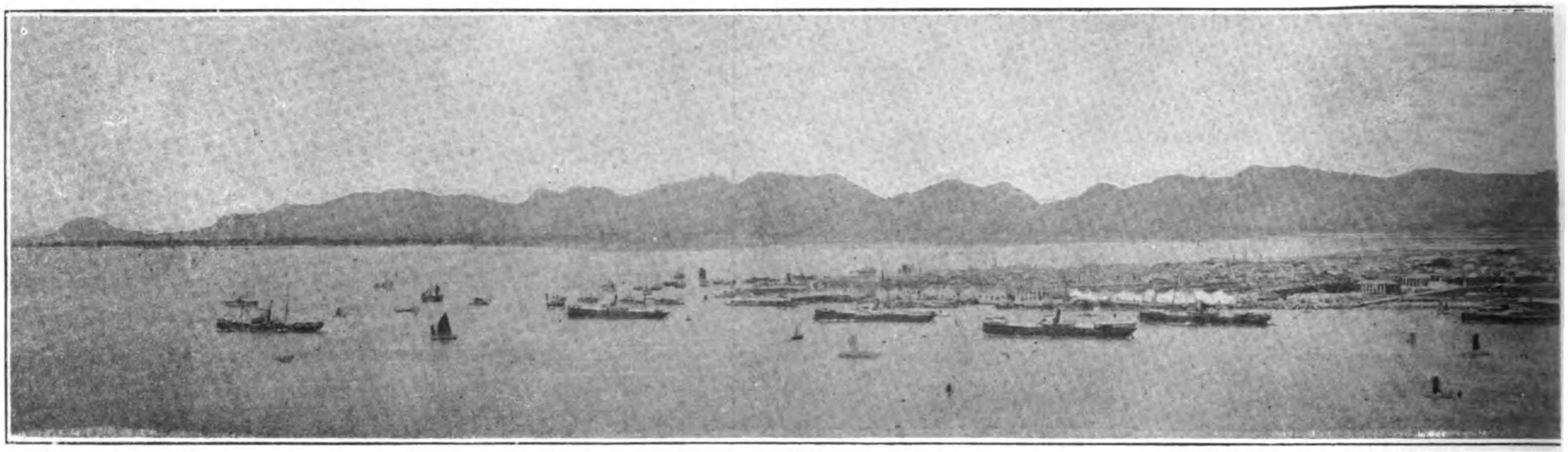
We are also makers of commercial motor trucks, and other types of fire apparatus.

Write to-day for further particulars to one of the following :—

Okura & Co., Tokyo, Japan.
Cary & Co., Canton, China.
Milton E. Springer Co., Manila, P.I.
Mustard & Co., Shanghai, China.
Andersen, Meyer & Co., Ltd., Foochow, China.
Dodge & Seymour (India) Co., Ltd., Calcutta, India.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

Export Department, 250 West 54th Street, New York, U.S.A.
Cable Address : "AMLAFRANCO"
Codes : A.B.C. 5th Edition. Western Union, Bentley's.



PANORAMIC VIEW

Roads and Motors in South China

200 Miles of Macadam Roads to be Built

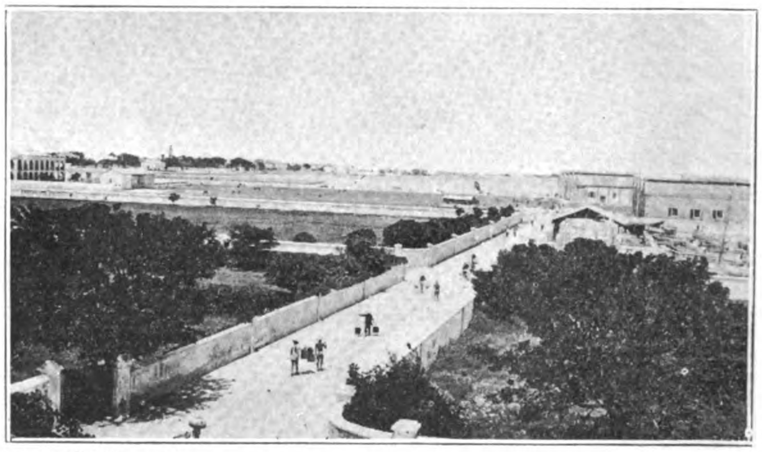
The Swatow District

THE often extolled progressiveness of Canton is not confined to that city alone in Kuangtung, and due attention should be given to the highway construction planned and, in fact, begun in the Swatow consular district, which comprises the eastern portion of Kuangtung and includes approximately 17,000 square miles of territory. Up to the present the total length of highway in the district capable of accommodating four-wheeled vehicles has been less than two miles and this stretch is found within the limits of the city of Swatow itself, says a correspondent in *The North-China Daily News*. Now over 200 miles of macadamized highway is projected, some of which has already been surveyed, which will connect the largest cities of the district and also reach many villages. Motor buses, lorries and trolleys will be utilized on the highways, to carry passengers and to transport export cargo, which consists chiefly of sugar, to the port of Swatow.

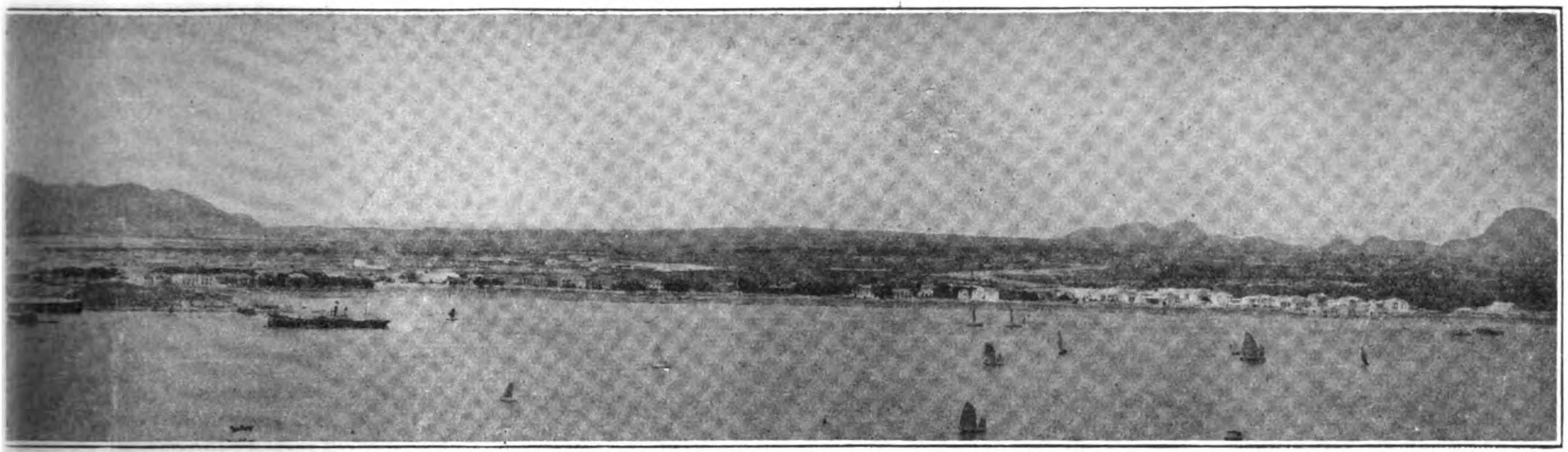
Harbor Development

Other plans have been made for harbor development to take place at a later date, when the entrance channel will be deepened to accommodate larger draft steamers. The approximate depth at the entrance is now 20 feet at high tide and seven at the lowest. The coast-line along the harbor limits is about two and a half miles in length. All the plans in connection with the development are being worked out by the department of highway engineering, organized at the instigation of progressive officials and business men of the province, whose object is to make Swatow into the great southern port for China.

Included in the comprehensive scheme of highways is one which will link Canton with Swatow. The main road to be built is one which will run from Chaochowfu to Kuetan, via Kityang, a distance of about 72 miles. This highway will connect with another which is being constructed between Kuetam and Waichow, whence a road is already built into Canton. The final link in the chain is the road, soon to be surveyed, between Swatow and Chaochowfu, a distance of about 24 miles. There is already in existence a railway line between the last-named two cities, which is the only railway in the whole of the Swatow consular district. It is considered that highways are more feasible than railways for the development of communication, because they will reach a greater area of country. Among the cities reached under the present scheme of highways are Ungkung ; Yaop'ing, northwestward from Chaochowfu ; Puning, Chaoyang and Huilai, all of these being the largest centres of population in the district and important avenues of trade. The highway from Chaochowfu to Kuetam passes through Haifeng, the birthplace and old home of General Chen Chiung-ming. The walls of this city have been completely torn down and wide streets are being made by order of the general and in spite of the fact that General Chen Chiung-ming's downfall was predicted when his ancestral tablet and the photographs of his parents had to be removed during the process of demolition. A few miles from Haifeng and on the coast is the port of Swaboi, second in importance to Swatow, and in this port, development and improvement is being carried on under the direction of Mr. K. Y. Chen, a graduate of Cornell University and a relative of General Chen Chiung-ming.



New Roads in the Swatow Settlement



OF SWATOW

The Scheme of Roads

The roads as planned, which are under the direction of Mr. F. H. Kuan, are to be 30 feet in width, graded according to the most improved methods, and surfaced with macadam. All the bridges are to be of reinforced concrete and not less than 30 feet wide.

The country traversed by the road between Chaochowfu and Canton is said to be very beautiful, for the most part level, cut into small fields of rice and other crops, but with small hills at frequent intervals and one range, at least, of mountains, which will have to be crossed or tunnelled. The mountains are rocky and will afford the granite and rock necessary for the construction of the highway. This one road is estimated to cost about one million dollars. The cost of surveying is being paid for out of a tax on joss paper and one or two other luxuries and the returns are said to be more than enough for the purpose. The major portion of the expense of construction will be borne by the cities and villages through which the highway will run. The macadam surface, which is the most expensive portion of the construction, will not be applied by the highway engineering department but by an operating company which, in return for surfacing the highway, will be granted a monopoly to run motorbuses for a period of 20 years over the roads, after which the expense of keeping them up will revert to the government.

The possibilities of this development as planned will be seen to be very great when it is considered that all communication heretofore has been the limited one afforded between cities and villages by boat over rivers and canals and, where these have failed, over three-foot pathways constructed of pounded sand and lime, which are satisfactory for foot traffic. The wheel-barrow, so ubiquitous in northern and western China, is totally unknown in this district, and overland freight and passenger traffic is entirely carried in baskets slung on poles and in sedan chairs respectively, on the shoulders of men and women.

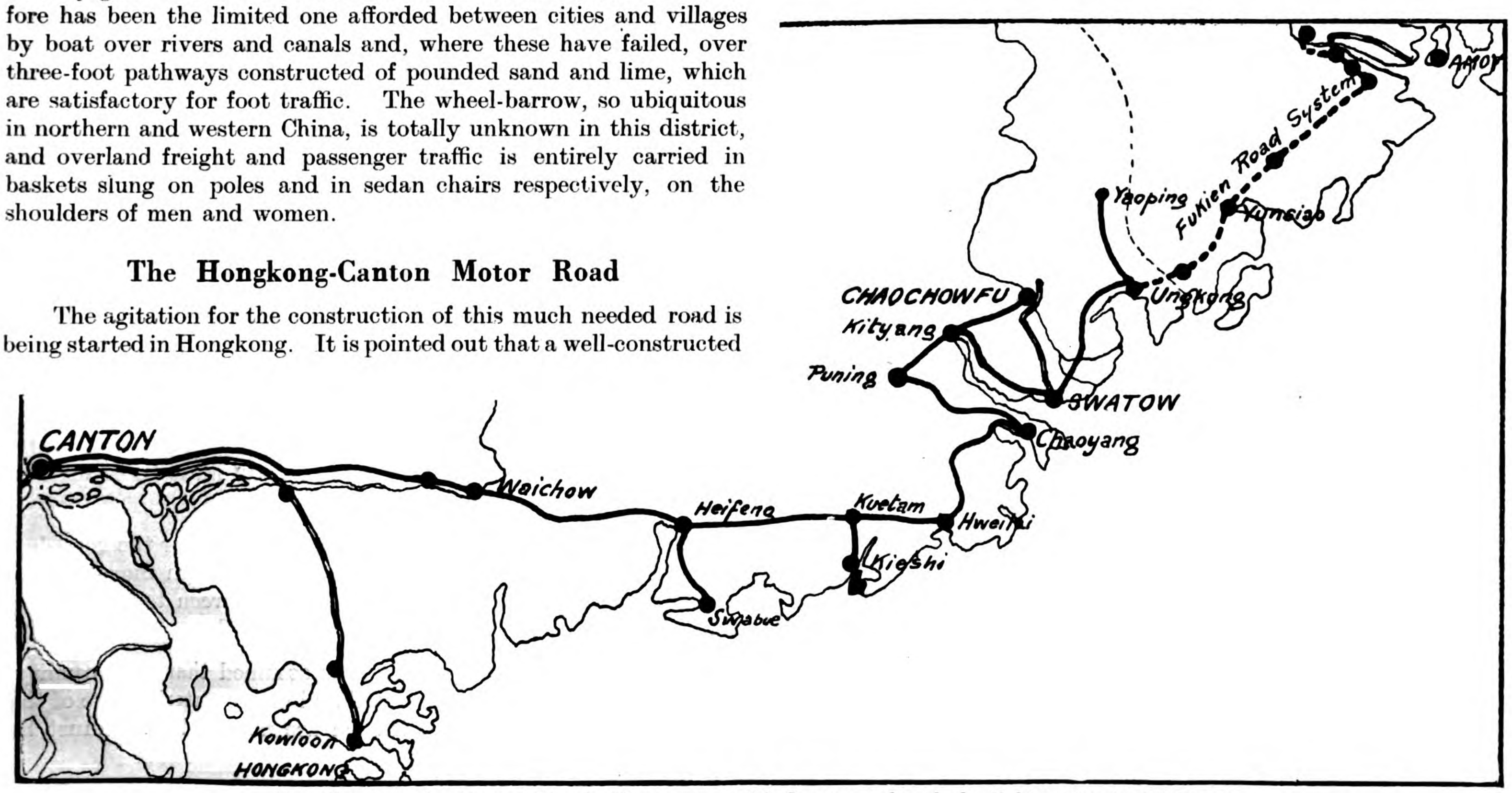
The Hongkong-Canton Motor Road

The agitation for the construction of this much needed road is being started in Hongkong. It is pointed out that a well-constructed motor road connecting Hongkong and Canton would soon become an asset of world-wide importance for all this section. Its fame would spread to every corner of the globe. It would mark these two cities as enterprising and progressive communities. In dollars and cents the income direct and indirect would soon far surpass the outlay.

It is suggested that meetings be called in both cities and a Canton-Hongkong highway association formed with offices in both cities. It is urged that prominent men in both cities be found who will co-operate with a live executive with at least one Chinese and one European to lead in the matter. Difficulties and problems connected with the matter can all be met and disposed of if a group will set themselves unwaveringly to their task.

In a leading article supporting the project, the *Canton Times says :* Besides being a connecting link between the two cities, such a road would also open up a rich, fertile, agricultural section, and by means of motor communication, make it possible for the farmers to bring their produce to Canton where they can obtain better prices than in the market towns in the interior. This would enrich the farmers and give both Hongkong and Canton new sources of food supplies.

Short roads intersecting this motor road could be constructed by the villagers and a motor truck service should bring their produce to the nearest railway station on the Canton-Kowloon Railway. The freight service of that road would soon have to be increased.



New Roads in the Swatow District Connecting with Canton and with the Fukien Provincial System

The facilities offered by this motor road could be utilized whenever the authorities have to deal with robbers in that section of the country. Better communication is one of the factors in the solution of the bandit problem in this province. If the road is well policed and an efficient telephone system installed along its whole length, soldiers could be moved to points wherever their services are needed.

Cars, Cabs and Boats in Hongkong

A few months ago, some Chinese in an outlying fishing village started a service of motor-omnibuses into the city of Victoria. Now the latest advance is the small taxicab. The type is probably well known to readers of this journal; it is a sort of an enclosed sidecar and motor-bicycle outfit.

In a few months 100 British-built taxicabs will be plying for hire in this colony, says the correspondent of the *Times Trade Supplement.* The chair is slow, and the ricsha, with a man puller, is more popular where the roads admit of that vehicle. Where a ricsha can go it is probable that the new taxicabs will go. The really interesting thing to watch will be the practical results. Will petrol prove cheaper than human muscle? It will certainly be much more popular.

The man pulling a ricsha receives about ten cents, Hongkong currency, a mile. That is, with a normal exchange, just about 2½d. He carries only one passenger. The new taxicabs are supposed to carry two passengers at 15 cents a mile. When the motor-boats now plying for public hire in the harbor first appeared people asked how they could compete with the native rowboats or sampans. They soon proved to be much more popular. Quite a number of motor-boat engines have been imported, not only into Hongkong, but to other places in South China, as a result of the success of those that have plied for hire in the local harbor.

The New Canton

A recent visit to Canton showed that the Chinese municipal authorities there are continuing the plan for the construction of wide roads, or "maloos," as they are called, in that city. Creeks are being filled in. That will make mechanically propelled vehicles possible. There is also a revival of the idea of a bridge across the wide river at Canton. It is said that the municipality has prepared plans and has estimated the cost of such a bridge at about a quarter of a million pounds sterling. The only difficulty is the dearth of money in Canton. However, as the Chinese merchants in Hongkong very promptly guaranteed a fund of about a quarter of a million pounds sterling to ease the recent "general strike" negotiations, it is not improbable that money could be raised in Canton for the proposed bridge if the merchants could be persuaded that the commerce of the city would benefit.

Every new road and bridge that is built in South China is sure to improve trade. The immediate effect will be to revolutionize the methods of transport. The sedan chair and the man-pulled ricsha will pass away from the Far East as surely as the sedan chair has disappeared from London.

Tractors in China

CONSUL-General Heintzleman, Hankow, reports that there has just arrived at Hankow a shipment of agricultural machinery and implements from the United States. The order was placed through a local American concern in connection with the development, by a group of Chinese capitalists of Hankow, of 13,000 acres of land in northern Honan, south of and bordering on the Yellow River.

The promoters of the enterprise intend first to undertake the cultivation of peanuts. The shipment consists of one wheel-type tractor, two disk harrows and two two-furrow gang plows. This is a trial purchase and if the machinery and supplies prove satisfactory additional orders will be placed; moreover, other farming implements and harvesting machines of various kinds will be ordered as required.

Motor Omnibus Laws in Singapore

THE president states that an amendment of the motor omnibus bye-laws is brought forward for the enforcement of regulations for the testing and examination of motor omnibuses, and moves that the following amendment be passed.

After the first day of April, 1922, " no vehicle intended for use as a motor omnibus shall be licensed which has not been inspected, tested and approved by the municipal superintendent of machinery and which does not further comply with the regulations set out in the following schedule :--

Regulations for Motor Omnibuses

Steering Gear.—Must not be more than ¼ turn slack.

Omnibus Bodies.—For one ton chassis and under the overhang must not be more than one-fourth of the wheel base, the overhang to be measured from centre of rear axle to back of body, neglecting steps. For chassis over one ton the overhang at rear must not be more than 5 inches per foot of wheel base, the overhang to be measured as above.

Width.—The body must not extend more than 6 inches outside the other rims of rear wheels.

Height.—The over-all height of body from ground level must not be more than 8-ft. 9-in. for one ton chassis or under and not more than 9-ft. 3-in. for chassis over one ton. The height from floor of bus to ceiling must not be less than 5-ft. 6-in. Top of floor to be not more than 7½-in. above top of chassis frame. Floor boards to be not less than ⅞-in. thick.

Seating Accommodation.—The minimum seating space per passenger must not be less than 15 inches, except that a seat for two passengers only may be of a minimum length of 27 inches. The maximum height of seat must no exceed 17½ inches measured from floor to top of seat.

Construction of Body.—When chassis frame is less than ¼ inch thick, the cross members must rest on fore and aft runners not less the 3-in. deep by 2½-in.

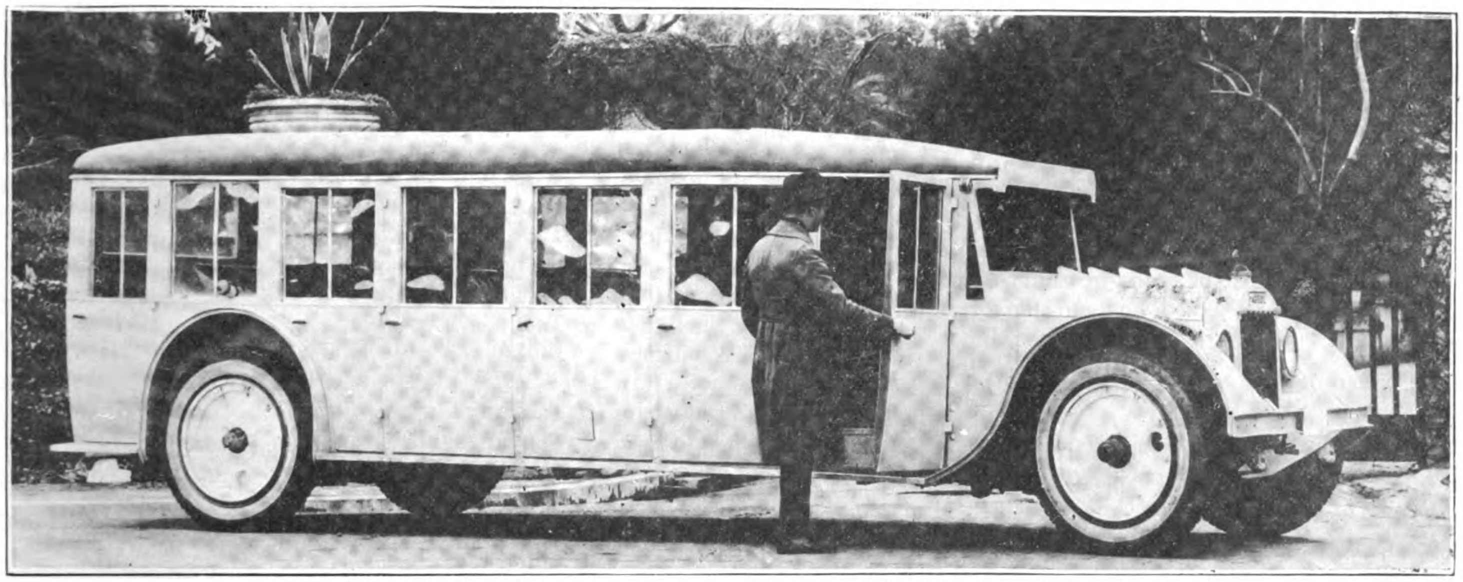
Each runner to be secured to chassis frame by not less than 3 clips. The clips to be not less than ⅜-in. iron with a plate of not less than 2-in. by ½-in. on the bottom side held in position by nuts. When the clips pass round the frame a wooden block must be tightly fitted into the frame in such a manner that it is impossible to remove it without taking off the clip. The body must rest on cross members spaced not more than 3 feet apart.

The cross members to be not less than 3-in. deep by 2½-in. cross section and secured to the fore and aft runners by bolts of not less than ⅜-in. dia., washers to be fitted under head of bolt and nut.

The fore and aft frame of the body must not be less than 2½-in. deep by 3-in. cross section timber properly secured to the cross members by bolts of not less than ½-in. diameter, iron washers to be fitted under head and nut of bolts. The upright member of the body must be properly secured to cross and longitudinal frame by angle bars or gusset plates. The top of body must be secured to the sides of body in a like manner.

No omnibus when complete in running order for the road but without passengers, driver or conductor shall weigh more than 4 tons. Ample clearance must be provided between top of wheels and body, if necessary by providing buckets in floor.

N.B.—Where sizes are given it is assumed that best quality, chengie, balau or teak wood are used and other materials are of the best and strongest kinds and if such are not used sizes must be correspondingly increased.



The Popular Fageol 20 Passenger "Safety Bus" on 188-in. Wheelbase Chassis.

Safety Bus for Chinese Roads

THE rapid construction of motor roads in China and elsewhere in the Far East is calling more and more for a passenger bus that permits of easy entrance and exit, and ability to crowd as many passengers as possible in a limited space. Highway transportation which has made such phenomenal strides in other parts of the world, is destined to be the solution to traffic congestion in China, and there more than in any other part of the world, luxury must give place to carrying capacity. The greatest efficiency cannot be obtained by the use of rebuilt touring cars or trucks A specially designed bus built up on a special chassis seems the only manner by which a passenger bus can be turned out to meet peculiar Chinese and Asiatic requirements, and here the Fageol Motors Company, of Oakland, California, claim to have scored over other manufacturers.

The Fageol 20-passenger safety bus an on 188-in. wheelbase chassis, with its ease of entrance obtained in the "Safety" stage by the use of a wide running board, extending inside the doors and body sides invites the confidence of people who are otherwise adverse to motor transportation. This passenger stage is designed for hard service at low operating expense. It is neither a truck which has been equipped with a stage body, nor is it a rebuilt passenger car, but a stage body on a stage chassis, built for running 100,000 miles without an overhauling. The Fageol special school bus, the latest addition to their line, is peculiarly adapted for ordinary highway traffic in China, being designed for safety, strength, dependability and economy, providing every possible protection for the passenger.

The future popularity motor transportation, especially in China, depends upon safety, perhaps more than any other consideration. The Fageol "safety" bus is built with a very low centre of gravity and a wide tread of 70-in. This freedom from danger of overturning is of vital importance to both passenger and stage operator.

These buses are equipped with a Fageol Hall-Scott, 4 water cooled cylinders cast in block. Detachable overhead valve and cam shaft head with single cam for both intake and exhaust. Bore $4\frac{1}{4}$-in. by $5\frac{1}{2}$-in. stroke. Horse-power, 28.9 S. A. E. rating, actual 62 h.p. at 1,800 r.p.m. Three point suspension on thermoid pads. Maximum motor speed of 1,800 r.p.m. controlled by enclosed governor.

Passenger Autos in China

THERE are 6,866 passenger cars, 437 trucks and 792 motor cycles in the various cities of China, according to a conservative estimate, based on the most reliable figures available, by Commercial Attaché Arnold, Peking. It is difficult to ascertain what percentage of the cars are of American make, but the fact that the United States furnished 47 per cent. of the motor vehicles imported in 1918 (641,346 Haikwan taels worth), 59 per cent. of those imported in 1919 (1,404,388 taels worth), and 57 per cent. of the imports in 1920 (amounting to 2,191,644 taels) may serve as the basis of an estimate.

Shanghai had on January 1, 1922, a motor population of 3,242 passenger cars (of which 30 were electric) and 536 motor trucks. The total 3,778 constitutes an increase of approximately 30 per cent. over the number in use on January 1, 1921. It has been calculated that approximately 87 per cent. of these cars are American, of which 10 well-known American makes contitute 71 per cent.

The following table shows the growth in the number of motor vehicles licensed in fhe French concession, Shanghai, from 1913 to 1921 :—

Kinds of vehicles.	1913	1914	1915	1916	1917	1918	1919	1920	1921
Motor cars :									
Private	89	104	135	180	272	336	346	503	698
Public	—	—	77	83	97	121	192	250	307
Commercial	3	3	2	4	6	6	6	11	17
Trucks	—	—	—	—	—	—	2	127	206
Motor cycles	4	5	6	7	11	16	18	31	34
Total	96	112	220	274	386	479	564	922	1,262

These figures, while comprising only a part of the city of Shanghai, illustrate the increasing popularity of motor vehicles.

Good Roads in China

THIS list bears no claim to accuracy or comprehensiveness. The responsibility for road construction in China is vested in so many authorities, governmental, provincial, or private, that a complete record is impossible to obtain. However, all the particulars in this survey have been verified either from a responsible government department or from the offices of private road constructors, and the list may be taken as the foundation of a complete statement which, as time goes on, it will be possible to publish.

The following is a list of roads in China actually constructed, under construction, or projected, and suitable for motor transportation :—

From	*To*	*Condition*	*Mileage*	*Builder*
CHIHLI				
Peking	Yuchuanshan	Constructed		Government
Peking	Tangshan	,,		,,
Kalgan	Urga	,,	643	Ministry of communications
Kinghsien	Tehchow			
Tsangchow	Shihkiachwang	,,	139	Ministry of communications
Tientsin	Paoting	,,	75	American red cross
Fowchenmen	Sankiatien	Under construction		Private
Taming	Hantan	Constructed	46	American red cross
Hantan	Kwangteh	Under construction		
Kalgan	Dolon-nor	Projected	219	Ministry of communications
Kalgan	Shantu	,,	125	,,
Peking	Tientsin	Under construction	72	American red cross and government
Pingtichuan	Taoling	Projected	63	Ministry of communications
SHANTUNG				
Tsinan	Lokow	Constructed	6	Private
Chefoo	Weihsien	,,	180	Governmental
Tsaochwang	Ichow	,,	150	Provincial
Tehchow	Nankunghsien	,,		Private
Yellow River	Road and branches	,,	123	American red cross
Chefoo	Weihaiwei	Projected		
Chefoo	Haiyang	,,		
Tehchow	Lingtsing and Kwantao	,,		
SHANSI				
Taiyuan	Taiku	Constructed		
Pingting	Cheng-Tai Rly.	,,	78	American red cross
Kueihua	Paotowchen	,,		
Tatung	Taiyuan	Under construction		
Taiyuan	Kohsien	Projected		
Taiyuan	Pingyang	,,		
Pingyao	Fenchow	,,		
Yangchuan	Liaochow	,,		
HONAN				
Siping	Yencheng	,,		
Yencheng	Chowkiakow	,,		
Kweiteh	Pochow			
(Honan)	(Anhwei)	,,	45	Private
Shenchow	Sian (Shensi)	,,	156	Provincial
SHENSI				
Sian	Tungkwan	Projected	100	Governmental
Tungkwan	Shenchow (Honan)	Under construction	54	Private
KIANGSU				
Shanghai	Woosung	Constructed		Provincial
Susieh	Hsuchow	,,	80	Private
Nanking	Tangshan Hot Springs	,,		Private
Shanghai	Cheling	,,	23	Provincial
Shanghai	Tachang	,,		Private
Changshu	Liuho	Under construction		
Changshu	Taitsang	,,	23	Private
Tantu	Tanyang and Nanking	Projected		Provincial
Kuyung	Kingtan and Nanking	,,		,,
Kiangpu	Luho and Nanking	,,		,,
Chinkiang	Tsingkiang	,,		Private
Tsingkiang	Nantungchow	,,		,,
Nantungchow	Haimen	Constructed		
Soochow	Taitsang			
Soochow	Fooshanchen	Projected		,,
Tsingkiang	Hsuchow	,,		,,
Tsingkiang	Haichow	,,		,,
Tsingkiang	Pukow	,,		,,
Soochow	Huchow	,,	245	,,
Yangchow	Kwachow	,,	11	,,
Kiangying	Wusih	,,		,,
Yangssuchiao	Lulichiao	,,		,,
CHEKIANG				
Kashing	Chapu	,,		
Ningpo	Tzeki & Chinhai	,,		
Huchow	Kwangteh	,,	35	
Haining	Changan station	,,		
Sincheng-kwan range	Changchen of Shangyu	,,	67	Provincial
Hangchow	Yuhang	,,		
Changshan	Yushan (Kiangsi)	,,	27	
Hangchow	Shanghai	,,		Private and provincial
Chaoan	Futing	Under construction	350	Provincial
Fengshih	Kwangtseh	Projected	505	,,
Nanyu	Hokow	,,	342	,,
Haiteng	Wuping	,,	178	,,
Fuan	Shaowu	,,	238	,,
KIANGSI				
Nanchang	Kanchow	,,	275	,,
Nanchang	Kwangsin	,,		,,
Nanchang	Ningtu	,,		,,
Nanchang	Kingtehchen	,,		,,
Nanchang	Shangkao	,,		,,
Nanchang	Pinghsiang	,,	Total 1,200	,,
KWANGSI				
Lungchow	Shuikow	Constructed		,,
Nanning	Wuchow	Projected		
Kweilin	Monkong	,,		
KWANGTUNG				
Sunwui	Kongmon	Under construction		,,
Sunwui	Pakhoi	Projected		,,
Sheklung	Lohfoshan	,,		,,
Lohfoshan	Tsengshing	,,		,,

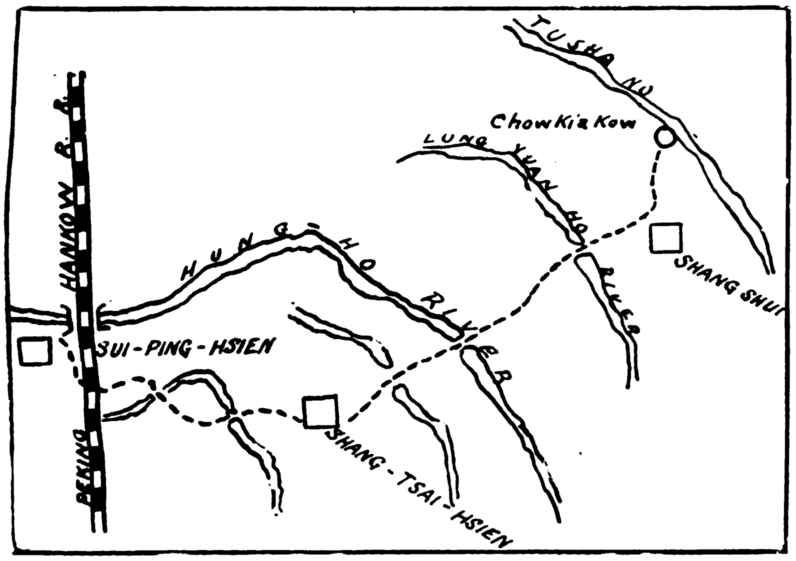
From	*To*	*Condition*	*Mileage*	*Builder*
SZECHUAN				
Chengtu	Yachow	Constructed		Provincial
Chengtu	Kwanhsien	,,		,,
Chengtu	Chungking	Projected	265	,,
Chengtu	Pachow	,,		,,
Chengtu	Wanhsien	,,		,,
Chengtu	Kwangyuan	,,		,,
HUNAN				
Changsha	Siangtan	Constructed		,,
FENGTIEN				
Hsifeng	Kaiyuan	Projected		
ANHWEI				
Kwangteh-chow	Szean	,,		,,
Wuhu	Suanchen & Kwangteh	,,		,,
Pochow	Suchow	,,	80	,,
Anking	Luan	,,		,,

Distances, where given, are in English miles.

(Government Bureau of Economic Information.)

Suiping-Chowkiakow Motor Road

THE magistrate of Shangtsai-hsien, Honan, is planning to construct an automobile road from Suiping to Chowkiakow, with the city of Shangtsai-hsien as the centre. The distance to the Peking-Hankow railway station at Suiping on the north-west, is about 57 *li*, and to Chowkiakow on the north-east, about 110 *li*. The road will have a width of 16-ft. and be macadamized. Ditches will be dug on both sides and trees planted. In addition to the automobile road, there will be built another byway, 1-ft. lower than the minor road, 6-ft. wide, for heavy traffic.



Sketch Showing Line of Projected Motor Road

It is estimated that the section from Shangtsai to Suiping (57 *li*) will call for 5,000 *fong* of earth filling as a cost of $400, 10,000 *fong* of gravel at $25,000, and 500 *fong* of sand at $500, and from Shangtsai to Chowkiakow (110 *li*) 10,000 *fong* of fill at $800, 19,000 *fong* of gravel at $43,500 and 1,000 *fong* of sand at $1,000, or a total of $71,200 to complete the whole road. In the above figures the cost of bridges is not included.

When the scheme is approved, a road construction department will be created to carry out the work ; and when completed, the department will enjoy an exclusive privilege for operating a motor transportation service thereon. For private cars and motor trucks a toll will be levied and the proceeds used for maintenance.

Market for Solid Tires in Tientsin, China

THERE is but a limited market for trucks in the Tientsin consular district, the few in use being equipped with solid tires. Until more trucks are in use, so as to enable the buyet to judge the merits as to price, durability and general advantages, it is believed by local dealers that solid tires for trucks will not find a large market in this region. It is estimated that there are about 60 motor trucks in the district, less than 20 of which are in operation. The remainder are either still in stock or are unfit for use.

The future success of the trade in motor trucks in North China depends entirely upon whether or not suitable roads are to be built. Those suitable for motor vehicles in Tientsin, Peking and their environs do not exceed 130 miles in length. Motor cars and trucks are operating on the Gobi Desert run at present, but until the highways are improved the journey, especially for heavily loaded motor trucks, will prove difficult and hazardous. Also, as regards the commercial feasibility of the use of trucks on this route, it is questionable whether they can compete successfully, on account of the low cost of camel and cart hire.

The use of motor trucks in the transport of passengers, to be operated as feeders for railway lines, has possibilities, but this again depends upon the construction of good roads.

Regarding the use of motor trucks in Tientsin, it may be stated that there is likely to be very little demand, for the reason that nearly all the mercantile houses are situated near to the wharf and the railway station, and coolie hire for the carriage of cargo to and from the bund and the railway station is very reasonable. No motor truck could ever hope to compete with coolie hire on a short haul.

Peking is not a commercial centre, and although the distances are much greater than in Tientsin and the mileage of good roads much larger, still there is some doubt as to motor trucks being used to any extent in the city for a long time to come. Motor cars are increasing in number, and no doubt in a few years the use of motor trucks in the delivery of coal and other supplies about the city will become more general. Furthermore, there will eventually be a demand for military motor trucks and motor trucks for bus lines to points outside of Tientsin and Peking. The sale of automobiles, motor trucks, tires and accessories is being vigorously pushed in this district. The advertising commonly resorted to embraces newspapers, both native and foreign, moving-picture screens, billboards etc.

Franklin Touring Car Makes Record in China

A FRANKLIN touring car driven by F. S. Williams broke all previous road records between Tientsin and Peking, China, on March 2, when he made the trip in three hours and nine minutes from East Gate, Peking, to the governor's yamên, Tientsin. The distance between the two cities is 80 miles, and over smooth American highways the time record set up would be nothing out of the ordinary. So far as this particular run is concerned, however, the time is deemed remarkable because the road, which is of none too good construction is only about two-thirds finished, the balance of the route taking the tourists over dykes, along an exceedingly rough car trail or road badly cut up by deep ruts.

Because the Franklin is air-cooled, it has long been a favorite with the military authorities in China, who find they can operate an air-cooled car over stretches of hundreds of miles of desert without stopping " to give it a drink." Until recently it used to take 40 days to make the 700-mile trip across the great desert of Gobi by caravan. The trip is now made easily in four days in a Franklin.

Motors and Roads in the Philippines

WITH a total of about 3,000 miles of first-class roads, the Philippine Islands had 13,341 motor vehicles registered with the bureau of public works at the end of 1921, an increase of 1,865 cars over the preceding year. China possesses 7,000 passenger cars according to the latest compilation, which gives the palm to the Philippines for being the most thoroughly motorized part of the Orient.

The beautiful palm fronded main South Road leading from Manila to Toyabas

Motor vehicles registered, with the bureau of public works at the end of 1921, was as follows :

	Old	*New*	*Total*
Private cars	5,446	1,020	6,466
For hire cars	1,838	228	2,066
Public utility cars	172	5	177
Private trucks	726	146	872
For hire trucks	407	52	459
Public utility trucks	685	61	746
Garage cars	364	33	397
Garage trucks	207	13	220
Government cars	326	49	375
Government trucks	383	67	450
Private motorcycles	682	75	757
Government motorcycles ..	240	116	356
Total	11,476	1,865	13,341

The general business depression was also felt by the automobile trade of the islands. The majority of the cars sold in the past few years have gone to the Filipino planters who with good crops, high prices and plenty of money ordered large numbers of expensive cars which found their way into the country. In addition to this luxury demand, large numbers of motor trucks were sold for freight and passenger transportation purposes, creating a situation seriously menacing the earning capacity of the railways, which are owned and operated by the government. This has had the effect of creating official hostility towards all new public utility motor transportation, evidenced in the decreased number of licences issued during 1921 for such purposes.

The Road System

The road system has reached the point where maintenance is a serious problem and engineers are puzzled over the question of the proper kind of road. At present macadam is in the lead, but the heavy traffic, motor vehicles and bull carts, breaks up the surfacing rapidly. The heavy rains in the rainy season do immense damage, while the long dry seasons permit rapid wear through blowing dust.

The status of roads and the history of road building can be understood through a study of the following table from the bureau of public works :—

PHILIPPINE PUBLIC WORKS STATISTICS

Total Mileage of Roads in the Philippines

	First Class Roads	Increase Per cent.	Second Class Roads	Third Class Roads
1907 ..	(*a*) 303			
1908 ..	423	40		
1909 ..	609	44		
1910 ..	764	25	(*a*) 641	(*a*)2,074
1911 ..	987	29	664	1,837
1912 ..	1,143	16	1,342	1,999
1913 ..	1,303	14	1,264	1,938
1914 ..	1,593	22	1,258	1,787
1915 ..	1,906	20	1,294	1,896
1916 ..	2,137	12	1,271	2,138
1917 ..	2,323	9	1,278	2,109
1918 ..	2,542	9	1,253	1,944
1919 ..	2,796	10	1,234	1,932
1920 ..	2,920	4	1,266	1,914

(*a*) No accurate statistics before 1907 and 1910, respectively.

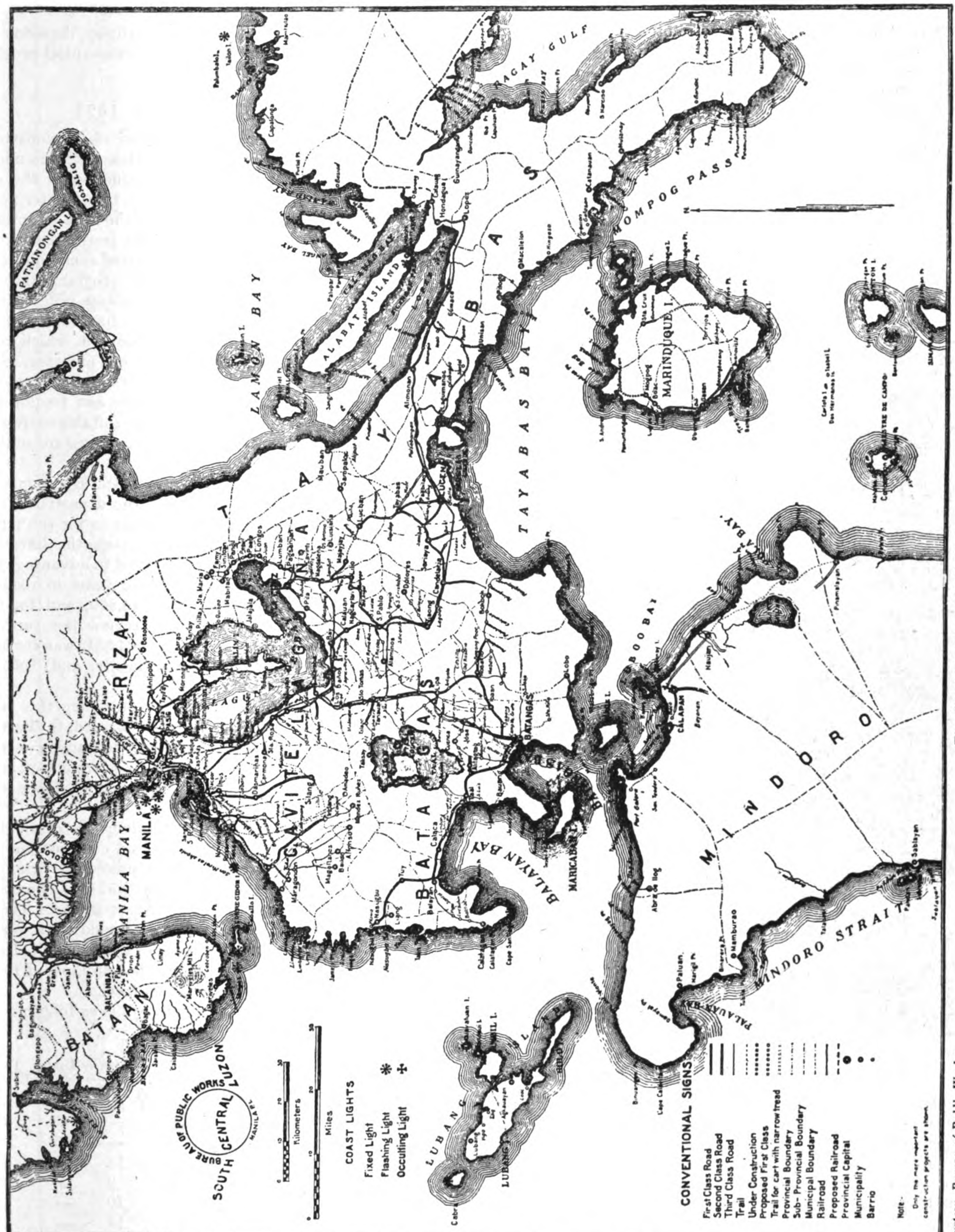
Years preceding 1914 are for twelve months ending June 30, 1914, and following years are for twelve months ending December 31.

Note.—First-class roads in this table include not only first-class roads officially designated but also first-class roads not officially designated as such.

The accompanying map showing the road system of southern Luzon, the largest of the islands, will give a good idea of the importance of these new roads as a factor in the development of this remarkably rich territory. The main south road from Manila to Lucban is also one of scenic beauty passing through the coconut garden of the Philippines, where as far as the eye can reach are groves of these slim fronded trees affording an ever entrancing vista, while far to the east stands cloud capped Banahao, monarch of Philippine mountains. The trip from Manila to Lukban and return a distance of 100 miles can easily be made in the daylight hours of a single day.

Aviation—France

The traffic of the Bourget Aero Station (near Paris) is increasing considerably, according to *La Journee Industrielle* of April 9-10. In March, 1922 there were recorded 315 airplanes, carrying 846 passengers and 21,908 kilos of merchandise. The corresponding figures for March, 1921, were 250 airplanes with 681 passengers and 8,725 kilos of merchandise.



Courtesy, Bureau of Public Works

The Southern Luzon Road System

Motors and Roads in Siam

AN estimate of the number of motor vehicles in use in Siam to August 15, 1921, gives the total of 1,435 passenger cars and 170 trucks, of which 1,400 cars and 130 trucks were in use in Bangkok, 25 cars and 10 trucks in Siamese Malaya and 10 cars and 30 trucks in northern Siam. Approximately 97 per cent. of all the cars and 75 per cent. of all trucks were in operation in the capital. The imports of cars and trucks into Siam from 1913 to 1921 is as follows :

Countries of Origin.	1913	1914	1915	1916	1917	1918	1919	1920	1921
United States	28	76	25	70	137	102	161	95	185
United Kingdom... ...	46	51	24	17	18	14	4	6	64
France	4	7	2	—	—	—	—	—	35
Germany	41	48	19	—	—	—	—	—	9
Italy	3	4	4	1	3	1	—	—	4
Other countries	3	4	2	1	2	3	5	5	24
Total	125	190	76	89	160	120	170	106	321

The Motor in the Home of the Elephants. The Cliff Gate (Km 50) on the Northern State Highway of Siam No. 3

The above list indicates that American manufacturers are meeting increasing competition. While in the year ending March, 1919, 95 per cent. of the number of cars and trucks imported came from the United States and 5 per cent. from other countries, the proportion was 90 per cent. to 10 per cent. in 1920 and 58 to 42 per cent. in 1921. An important addition to the importations of the year was the arrival from England of a second Merryweather automobile fire engine for the gendarmerie department of 45-50 brake horse-power capable of delivering 300 gallons per minute.

The development of the road program promises to give a stimulus to the automobile business in Siam. The example of British Malaya to the south with its magnificent system of roads and motor transport which acts as feeders to the railways has had a marked effect upon the policy of the Siamese railway department, and although progress is slow, in three years substantial progress has been made along these lines.

Highway Reports for 1921

In the last report on the administration of the department of ways in Siam for the year ending March 31st, 1922, the minister of communications emphasizes the great reduction in the costs of transportation with a consequent tendency to a greater volume of traffic all over that country as a result of the road program which is now in its third year. This is held to fully justify the government measures for continuing the work for improved communications.

Previous to the adoption of the new program, the confinement of highway administration for so many years within the narrow framework of local considerations had militated against the adoption of a broad comprehensive outlook which transport requires. Construction work under the new program, especially in the case of certain long-distance highways, has not yet had the time to advance so as to fully develop traffic and trading possibilities, but signs are not wanting that highways suitable for rapid forms of transport are going to contribute in a large measure to the rapid economic development of the country.

During the year under survey, Purachatra, the commissioner-general of state railways in charge of the department of ways, made an extended trip to Europe and America for the purpose of studying road-making practice and investigating the different types of road-making machinery that could be used to advantage in Siam. The total amount expended for the three years in road-making machinery and tools amounted to Tcls. 144,869, and for the year Tcls. 66,052. During the year under review the sum of Tcls. 1,470,127 was expended, of which Tcls. 604,551 was for construction account, Tcls. 532,598 for improvements, and Tcls. 270,241 for maintenance proper.

To the southern highway division containing the more important roads a sum of Tcls. 719,434 was devoted, to the northern, Tcls. 521,308, and to the central system containing mostly cart tracks, Tcls. 142,700. The total amount expended on highways under the new administration for the three complete years amounted to Tcls. 3,515,984.53.

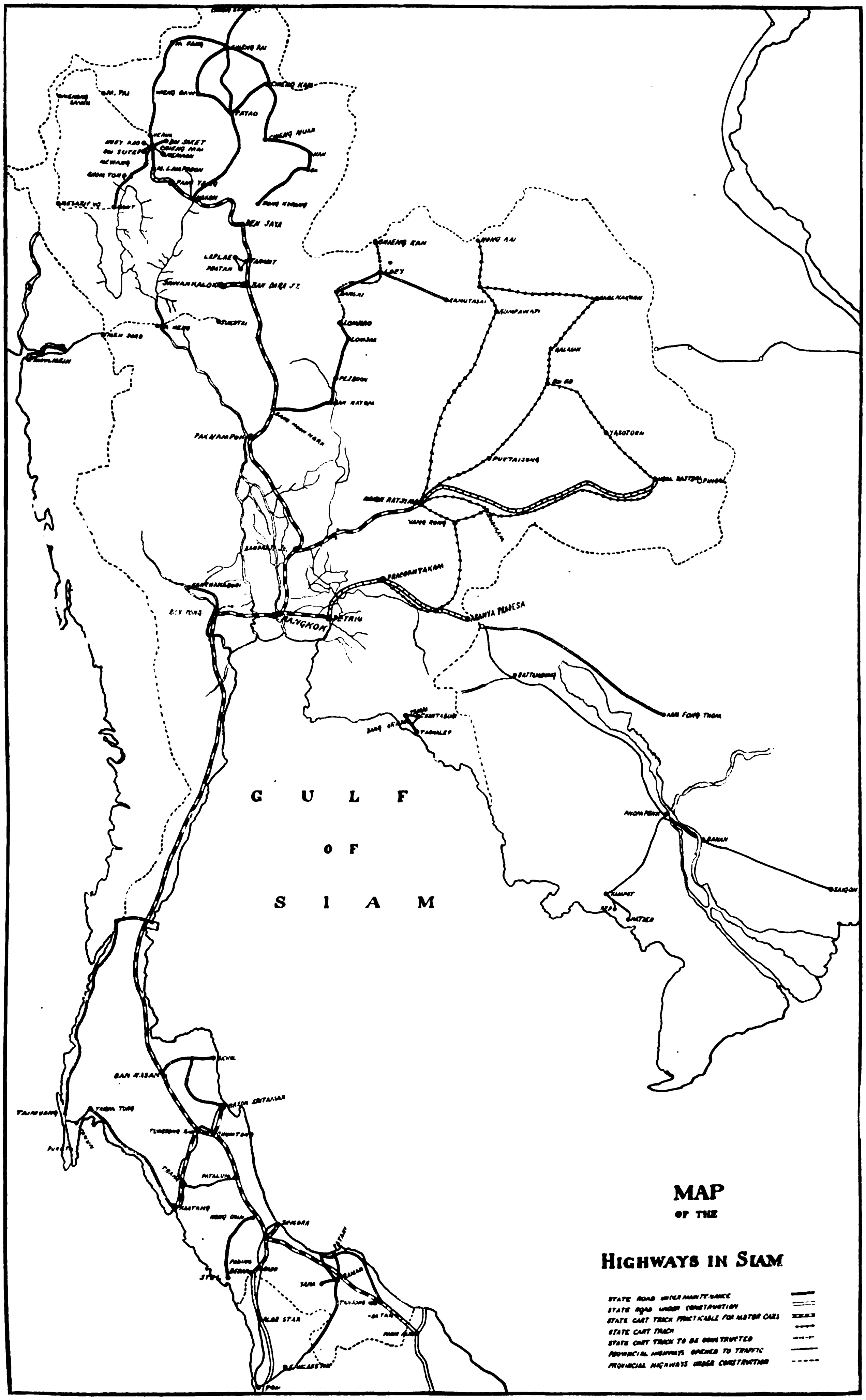
The report shows a total of 3,676 kilometres of all classes of roads under maintenance, improvement and construction in Siam, an increase of 109 kilometres over the preceding year. Of this total 420 kms. is in the northern division, with 57 kms. of second class, 290 kms. of third class and 73 kms. of cart tracks. The central division with 2,095 kms. has no first or second-class roads, but has 47 kms. of third class and 2,048 kms. of cart tracks. The southern division, with a total of 1,161 kms. has 83 kms. of first, 57 of second, 406 of third and 615 kms. of cart tracks.

The detailed list of the state highways is as follows:

NORTHERN DIVISION

No.	Between	Length of Highway Maint.	Impro.	Under Const.	Total Length	Class.
1	Den Jaya—Phrae	25	—	—	25	II
2	Lampun—Chiengmai ..	28	—	—	28	II
3	Lampang—Chiengrai ..	39	—	206	245	III
4	Chiengmai—Mae Rim ..	—	15	—	15	C.T.
5	Chiengmai—San Kambaeng	4	9	—	13	III
6	Chiengmai—Doi Saket ..	—	10	—	19	C.T.
7	Chiengmai—Mae Tachang	—	14	—	14	III
8	Swankaloke—Sukodai ..	—	—	39	39	C.T.
10	Utaradit–Phra Taen–Laplae	—	22	—	22	III
	Total ..	96	79	245	420	

The old state highway No. 9 (station to Lampang) has been merged into northern state highway No. 3 and forms part thereof.


GULF
OF
SIAM
BANGKOK
BEN JAYA
MAP
OF THE
HIGHWAYS IN SIAM
STATE ROAD UNDER MAINTENANCE
STATE ROAD UNDER CONSTRUCTION
STATE CART TRACK PRACTICABLE FOR MOTOR CARS
STATE CART TRACK
STATE CART TRACK TO BE CONSTRUCTED
PROVINCIAL HIGHWAYS OPENED TO TRAFFIC
PROVINCIAL HIGHWAYS UNDER CONSTRUCTION

CENTRAL DIVISION

No.	Between	Length of Highway Maint.	Impro.	Under Const.	Total Length	Class.
1	Bang Moon Nak-Petchabun	—	—	112	112	C.T.
2	Pak Preo—Hnong Kae ..	—	22	—	22	C.T.
3	Chandhaburi—Tha Chalaeb	—	—	12	12	III
5	Korat—Prachin	—	371	—	371	C.T.
6	Korat—Skol Nagara ..	—	405	—	405	C.T.
7	Bantum—Ubol	—	353	—	353	C.T.
8	Ubol—Roi Et	—	172	—	172	C.T.
9	Udara—Skol Nagara ..	—	162	—	162	C.T.
10	Korat—Knong Kai ..	—	391	—	391	C.T.
11	Pimul—Chong Mek Pass ..	—	—	35	35	III
12	Nang Rong—Buriram ..	—	60	—	60	C.T.
	Total ..	—	1,936	159	2,095	

SOUTHERN DIVISION

No.	Between	Length of Highway Maint.	Impro.	Under Const.	Total Length	Class.
1	Chumporn—Tap Lee ..	—	—	51	51	C.T.
2	Thanun—Takuapa ..	—	24	69	93	III
3	Kok Kloi—Kalai	—	17	—	17	III
4	Setul—Kuan Niang ..	—	40	46	86	III
5	Tongkha—Laem Kuan ..	35	—	10	45	II
6	Tongkha—Sala Ket Ho ..	12	—	—	12	III
7	Tongkha—Ban Rangaeng	18	—	—	18	III
8	Ban Ta Rua—Ban Bang Tao	8	—	4	12	II
9	Kan Tang—Patalung ..	—	96	—	96	III
10	Trang—Nagara (Ta Bae)	—	136	—	136	C.T.
11	Songkhla—Sadao	83	—	—	83	I
12	Ban Ko Hongse—Haad Yai	—	—	5	5	III
13	Raman—Kabu	—	10	—	10	C.T.
14	Patani—Yala	—	46	—	46	C.T.
15	Patani—Raman ..	—	75	—	75	C.T.
16	Patani—Tanjong Mas ..	—	122	—	122	C.T.
17	Yala—Yaha	—	11	—	11	C.T.
18	Ban Pong—Kanjanaburi ..	—	—	51	51	III
20	Sadao—Padang Besar ..	—	—	12	12	III
21	Yala—Betong	—	—	118	118	C.T.
22	Nagara-Rong Lek (Nobpitam)	—	—	46	46	C.T.
	Roads in Renong	—	16	—	16	III
	Total ..	156	593	412	1,161	

Personnel

The Siamese department of ways is under the ministry of communications at the head of which is H.E. Chao Phya Wongsa Nuprabadh, with head offices at Bangkok. The chief highway engineer is Phya Sarasastra Sirilakshana, with headquarters at Bangkok. The headquarters of the northern division is at Lampang, with Mr. G. Canova as chief construction engineer. The central division headquarters is at Bangkok under the direction of the chief engineer. The southern division is in charge of Mr. E. Wyon Smith.

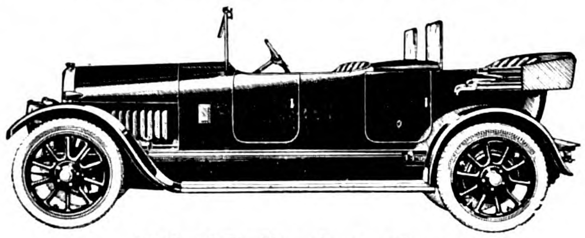
All Imperial Airship Scheme

Strong support is being given by industrial interests in Great Britain to the scheme for establishing a commercial airship service between Britain, India and Australia. It is confidently expected that the British air ministry will recommend the government to assist this enterprise, for which detailed and promising estimates have been drawn up. Meanwhile the speed of British air services to and from France is increasing. Recently a record was established by a British machine on which four successive single trips between London and Paris were made in the interval between 6.55 a.m. and 5.40 p.m. Out of $10\frac{3}{4}$ hours between the first ascent and the last descent 8 hours 52 minutes were actually spent in the air. The total distance covered was about one thousand miles.

Humber

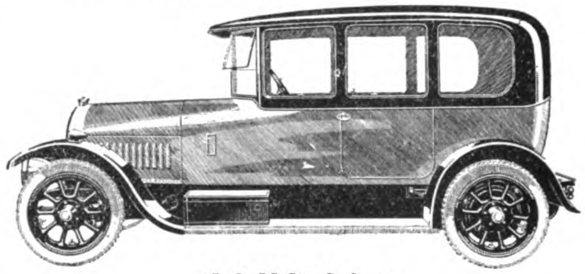
The Famous 15.9s

At all Motor Shows the Humber 15.9 h.p. models have elicited a chorus of praise. The Motor Editor of *Country Life* made a striking reference to the engine. "A smoother running engine," he said, "than the four-cylinder 15.9 h.p. Humber it would be difficult to conceive, and the flexibility makes one wonder whether the undoubted charms of the six-cylinder are really unobtainable by other means. The 15.9 engine is large enough to satisfy every demand that the normally-minded owner can make."



15.9 H.P. Five Seater Tourer

An entirely new note is struck in the All-Weather Feature attached to the open models—a real boon to Motorists. In a few seconds an open car can be converted into an All-Weather vehicle, thoroughly wind and weatherproof and attractive in appearance.



15.9 H.P. Saloon

A Triumph of engineering skill and accomplishment is the 15.9 h.p. Humber Saloon. It is the best of its kind; perfect in design, material, and workmanship, and remarkable alike for the superiority of its engine power, ease of control, and great refinement in appearance.

Models for 1922

11.4 H.P. 2-Seater (with double Dicky Seat) **11.4 H.P.** Coupe (with double Dicky Seat)
11.4 H.P. 4-Seater Touring Car **11.4 H.P.** Saloon
15.9 H.P. 5-Seater Touring Car
15.9 H.P. Saloon de Luxe

Full particulars on request

HUMBER, LIMITED. Head Office and Works: **COVENTRY**

Dealers in most parts of the World. Where no Agency exists applications for Terms are solicited

Catalogues of Cars, Motor Cycle and Cycles sent on application to Export Dept.

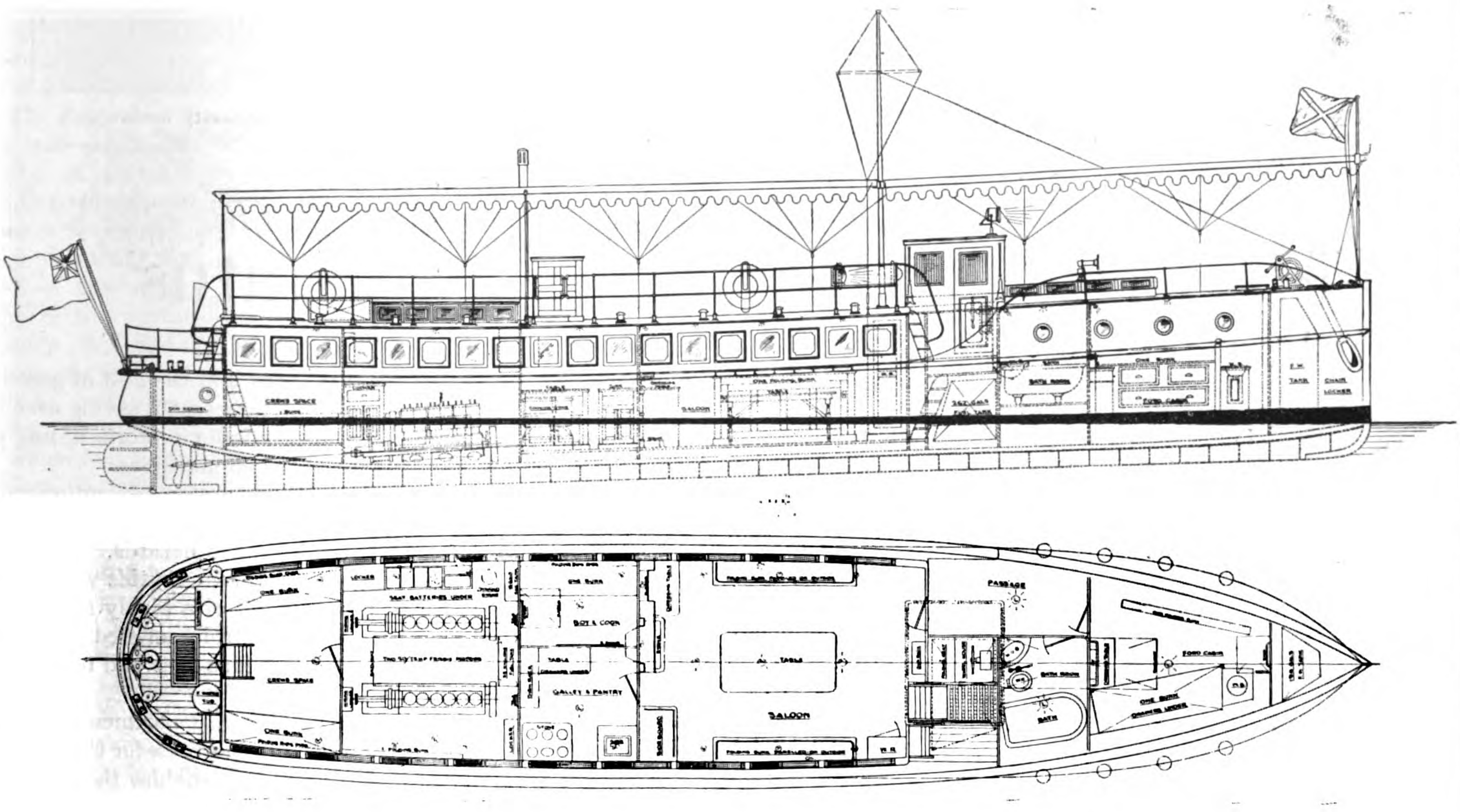
HUMBER, LTD., COVENTRY

Export Dept.: Humber House, 94 New Bond Street, London, W.

JARDINE, MATHESON & CO., LTD.

Builders of steel and wooden craft of any draft to suit inland waterways and harbor service.

First-class workmanship and material guaranteed
Motors and complete launches in stock.



AGENTS FOR—

CRUDE OIL	KEROSENE
WM. BEARDMORE & CO., LTD.	**GLENIFFER MOTORS, LTD.**
Heavy Duty Engines from 10-600 B.H.P.	**Kerosene Motors from 10-90 B.H.P.**

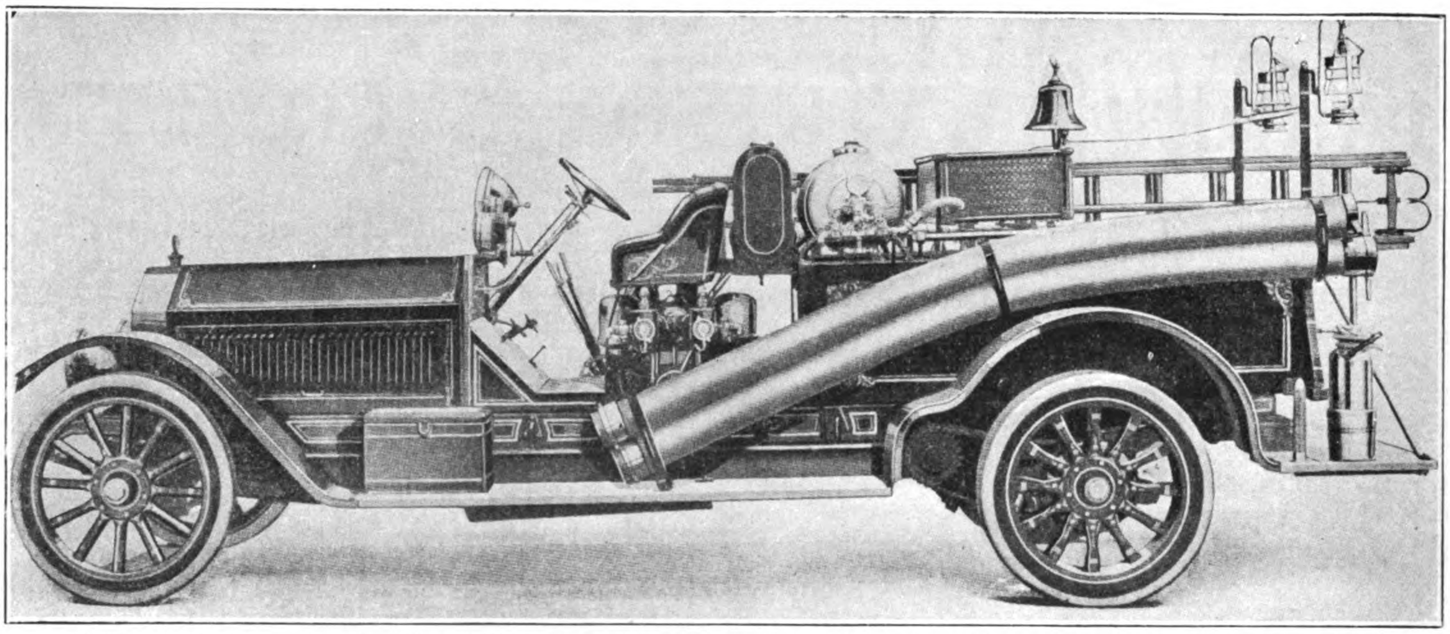
BRITAIN'S BEST IN MARINE ENGINES

WORKS—POOTUNG:
OPPOSITE THE BUND

TELEPHONE C. 241

OFFICE:
8A YUEN-MING-YUEN ROAD

SHANGHAI

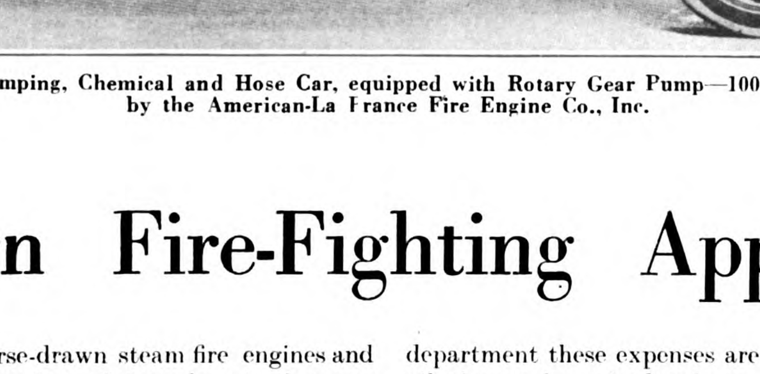


Triple Combination Pumping, Chemical and Hose Car, equipped with Rotary Gear Pump—1000 Gallons Capacity made by the American-La France Fire Engine Co., Inc.

Modern Fire-Fighting Apparatus

THE days of the old horse-drawn steam fire engines and trucks are rapidly passing, giving place to the more efficient motor-driven apparatus. Writing in *American Exporter*, Mr. Geo. W. Sutton, Jr., says that "in all parts of the world the elimination of horse-drawn fire-fighting equipment and the installation of motorized apparatus is taking place. The increased efficiency of motor-drawn fire-fighting vehicles, an increase which has been estimated at fully 40 per cent. in some of the world's largest cities, is rapidly making obsolete the use of horses for this vital service. Motorized equipment is, perhaps, less picturesque than that drawn by horses, but its cost is so much lower and its efficiency so much greater that progressive cities everywhere are turning to the newer method of fighting fires.

"One of the greatest elements in combating fires is that of quick action in attacking the flames. In this important matter the motor-driven fire truck stands pre-eminent. The motor fire engine can arrive at a fire and have the fight well under way before the horse-drawn engine has covered half the distance from its stationhouse. Through its characteristic speed in answering alarms, the motorized fire department is able to check fires before they grow large, cutting down the loss of life, property and money which all cities suffer through disastrous fires.



The American-La France Gear Pump

"Wherever a city has substituted motorized apparatus for the old horse-drawn engines, trucks, hose wagons, hook and ladder outfits and the other necessary parts of an efficient fire-fighting department, an immediate improvement has taken place. It has greatly reduced the taxes, due to the maintaining of a fire department because the operating expenses are lower. Feed, bedding and veterinary attention figure largely in the annual appropriation for a fire department employing horses. In the case of the motorized department these expenses are eliminated and the cost of gasoline, oil, tires and repairs has been shown to represent a saving over the former method. A city which once adopts motorized fire apparatus never goes back to the horse-drawn machines.

"Motorization plays an important part in fire prevention work. In the city of Detroit, Michigan, during the past year 35,000 inspections were made to discover and correct fire hazards. According to the chief of the Detroit fire prevention bureau, this would have been absolutely impossible without the aid of a highly mobile and efficient motor squad. As a result, Detroit suffered from 508 fewer fires in 1921 than it did in the previous year and reduced its fire loss more than $1,000,000.

"Not only does the motorization of fire departments increase the personal comfort and better working conditions for the firemen, but it enables them to do better work. It enables them, for instance, to get into action, after reaching a fire very much more quickly than in the old horse days. With a motor-driven fire engine, it is possible to get up the proper amount of water instantaneously.

"The installation of motorized fire apparatus is a thoroughly modern step in progress. It is going forward rapdily in all parts of the world and, before long, the use of motor equipment for this purpose will be universal in all progressive cities."

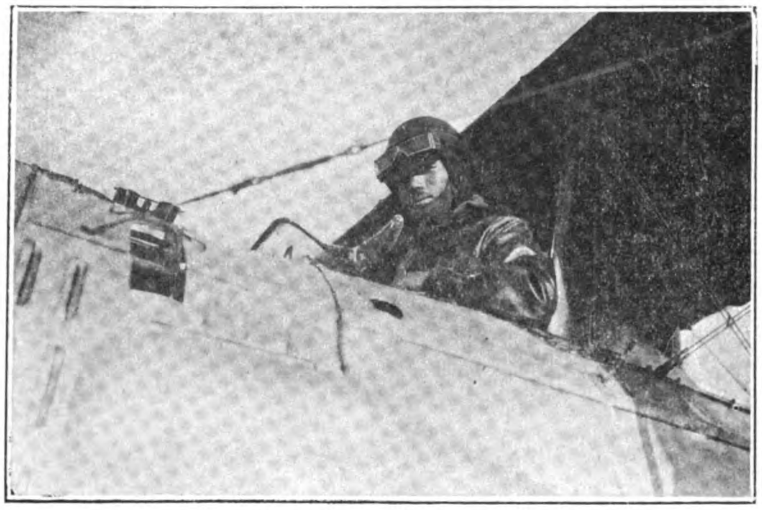
Foremost amongst those who have developed modern fire-fighting apparatus to a high state of efficiency, is the American-La-France Fire Engine Company of Elmira, New York, and here in the Far East their machines have contributed largely to the success of the Tokyo fire department in subduing and controlling the large fires, which, when once started, threatens to wipe out whole wards in that city of frail wooden buildings.

Aviation in Japan

A New Opening for American Machines

FOR the first time since the war it may be said that the Japanese market for aerial machines has opened up opportunities for American manufacturers. The Washington conference amongst other things, has given Americans an opportunity of selling in this market which they did not possess while it looked as though hostilities between the two countries might be precipitated as the result of the misdirected campaign of those who seemed to think that it devolved upon America to draw a cordon around the island empire. British, French, and aviators from other countries, were attracted to Japan and much capital was made out of the possibility of war with America. It ruined all hope of American manufacturers gaining a foothold in this market. Conditions have changed, and the demand for aerial transportation now manifested in Japan carries with it an opportunity for Americans which did not exist before.

The Japanese-American war scare was responsible for great activity in aviation in Japan, providing manufacturers of other countries an exceptional opportunity of getting their machines placed in this market. At the height of this agitation, it was currently reported in British aviation circles that the Avro Company had over a hundred training machines on order for the Japanese government, in addition to which, the latter had paid the same company the sum of £30,000 for the drawings and manufacturing rights of the standard Avro biplane. Forty Nieuport "Nighthawks," 40 "Sparrowharks" and a number of Nieuport "London" triplanes were reported to have been ordered from the Gloustershire Aviation Company. In addition, Short Brothers sold a dozen or so seaplanes for training, while some of the best of the Sopwith and Handley Page technical experts went to Japan to lay out the Japanese naval aircraft factory and organize production. From the accounts printed in the British and French technical press at that time, there is little doubt that full advantage was taken of a situation that hermetically closed the Japanese market to American aircraft manufacturers. With the Chinese government market closed to others by reason of the Vickers loan, the American manufacturer was quietly but effectively edged out of the Far East. The lead in these markets passed to Great Britain and France. The Washington conference has provided an opening for American manufacturers to retrieve their lost ground.



Mr. Yota, Famous Japanese Aviator

The Imperial Aeronautic Association

One of the most stimulating influences upon aerial transportation in Japan is the Imperial Aeronautic Association of Tokyo, having for its main object the development of aeronautical science and aerial machines for private and commercial use. Prince Kuni is president of this organization, Baron Y. Sakatani, vice-president and the directorate is composed of about thirty prominent personages.

The director-general of the association is Lieut.-General Kuno. The sum of Y.500,000 has been bestowed upon the Association by the imperial court out of the civil list. It was proposed to raise contributions amounting to Y.2,000,000, but bad times intervened, and the financial assets of the association now amount to only Y.720,000, including Y.470,000 the balance of the imperial grant. Apart from the imperial grant, Y.100,000 has to remain untouched as a foundation fund. The funds now in the treasury amounts to only Y.150,000.

Next year, an international aerial contest is to be held in Japan by aviators from Great Britain, the United States, France, Italy and Japan. At least Y.300,000 will be required, and the Association is at a loss as to how to raise the necessary funds. The popular subscriptions up to the end of 1921 were less than Y.500,000. The total appropriations for aerial corps of both Japanese army and navy during 12 years up to 1921 were Y.76,020,000, inclusive of Y.41,030,000 for last year, as against Y.120,000,000 for France and over Y.100,000,000 for the United States, both for the same year. An American tourist visiting Japan regretted to see aeronautics still toddling in infancy, and contributed Y.176,000 in two instalments.

France is allowing an annual grant of Y.3,000,000 and Great Britain Y.2,600,000 in support of private airmen, while Japan is giving only Y.50,000 for this purpose. As to aerodromes, Great Britain has 108 private aerodromes and France, 57, whilst Japan has not one.

Notwithstanding the rather gloomy picture presented by the above figures relative to the aeronautical association, other private interests are making headway.

Private Activities

The establishment of an aerial training school in Nagoya, and the organization of a lake aerial excursion company is contemplated by a civilian aviator of Kyoto. The latter is planning a visit to the United States for the purpose of purchasing a 400 h.p. eight-seater plane.

The reopening of a civilian aviation school at Nagoya, which was temporarily closed, is being planned.

The Mitsubishi Motor Company at Nagoya has made progress in the work of manufacturing the new Mitsubishi type of airplane, and will soon be turning out complete machines. The company's application for permission to establish an aviation field in front of its works at the port, has received official sanction.

A trial flight with an experimental airplane completed by these works, and in which a 300 h.p. Hispano-Suiza motor was installed, showed satisfactory results. While the details of the machine's construction are kept secret, it is said to be a high-speed fighting plane.

Work has been begun by the Aichi Tokei Denki Kabushiki Kaisha (Aichi Clock & Electric Machinery Company, Limited), on a factory in the neighborhood of Nagoya, to which the works of the company, now at Atsuta, will be moved later on. It is expected that it will be completed by the end of 1922. The present

works are capable of turning out one airplane a month, of the Yokosho type ; the new factory will have a capacity of 50 planes a month. Special attention will be given to the production of large commercial planes.

The Kawasaki Works of Kobe are contemplating the erection of airplane factories in the Gifu prefecture. Construction was scheduled to be started in November, 1921, and to be completed in the spring of 1922, when 500 workmen will be detached from Kobe to engage in the manufacture of airplanes.

General Notes

An aerial passenger service will be established between Tokyo and Osaka the latter part of the summer if the plans of a wealthy Japanese of Hamamatsu prove successful. He is reported to have made application to the national government for permission to establish the service and that his request was granted. According to his plan he will charge Y.90 for the trip between the two cities and will make the trip in three hours.

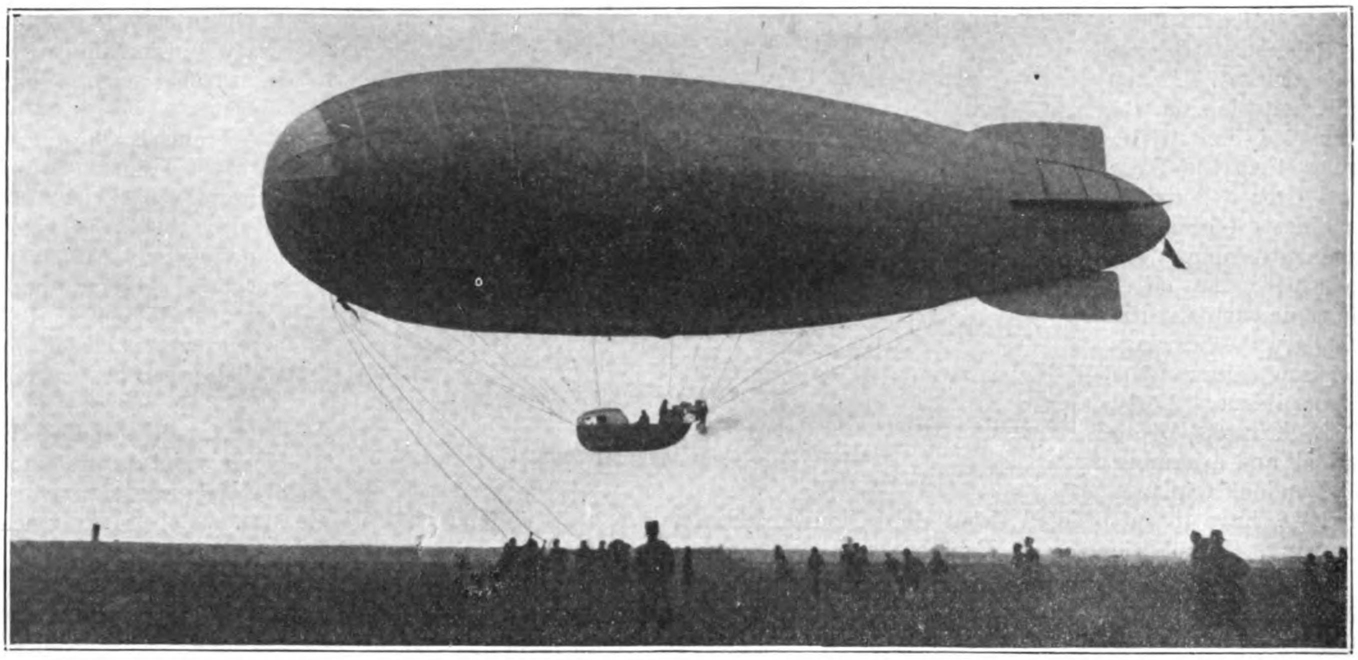
The greatest activity in opening up aerial routes in Japan seems to be in developing connections with Manchuria. Several flights have been made between Japan and Dairen to date. There has also been some talk about the establishment of a supplementary air mail service between Nagasaki and Shanghai to operate in conjunction with the steamship services of the Nippon Yusen Kaisha. The indications are, however, that unless such a service receives a liberal government subsidy no company will attempt to carry out a scheme which cannot hope for profitable returns as a purely commercial venture.

The Yokosuka naval station aero division successfully carried out a 1,400-mile flight on April 2, 1922, starting from Yokosuka and returning after visiting such places as Kure, Sasebo, Kagoshima and Wakanoura in South Japan. Three F. No. 5 aeroplanes took part in this flight.

Miss Seiko Hyodo, 24 years of age, successfully passed the Japanese government examination for a licence to pilot an aeroplane. She was given a third-class licence, the first woman to be licensed as a pilot in Japan.

Incombustible Paints Invented

One of the frequent causes of accidents to aeroplanes is fire. The authorities of all countries interested in aviation have made great efforts to discover some paint which shall make aerpolanes incombustible, so that when the plane is hit by shells, it will not catch fire. The national research laboratory of Osaka has produced an incombustible paint, the main feature of the invention being a fibre treated by acetic acid dissolved in acetone. When this mixture is spread on the plane the aceton evaporates and the fibre is left as a film covering the body. This film is incombustible.



Smallest Airship in the World

ABOVE is a view of the Societa Costruzioni Aeronautiche dirigible, the smallest airship in the world, which was designed by experts of the Italian army service. This new craft is only 117-ft. long and 25-ft. wide and is capable of traveling 45 miles an hour. It is designed especially for light express service.

The S.C.A. dirigible is provided with two engines, type Anzani, which is the same kind as was used by Bleriot when he made his historic flight across the channel in 1911 ; these engines are of 40 horse-power. With one engine running, this dirigible can attain a speed of 35 miles an hour, and with two engines as high as 50 miles an hour are attained. Fully loaded this dirigible with one engine running, making a speed of 35 miles an hour, has a flying radius of 1,300 kilometres ; with two engines, and running at a speed of 50 miles an hour, it has a flying radius of 800 kilometres without stopping.

The S.C.A. dirigible is not intended for passenger service, although it may be mentioned that the first passenger to make a flight in a dirigible of this type was Signor Ferrarin, the intrepid young man who made the flight from Rome to Tokyo something over a year ago.

The gross carrying capacity of this dirigible is 670 kilos. Deducting from this 170 kilos, the average weight of two men, and 100 kilos ballast, there remains a net carrying capacity of 400 kilos, or 880-lb.

The combined consumption of oil and gasoline of the S.C.A. is only 30-lb. per hour and the "bag" only requires a renewal of 20 cubic metres of hydrogen after a day's use. Only two men are required to take it out of the hangar.

The first airship of this type was constructed in the latter part of last year and the first trial took place on the 14th of February this year. The first two airships made were sold to the Spanish government.

Twenty Years of Motor Car Devotion

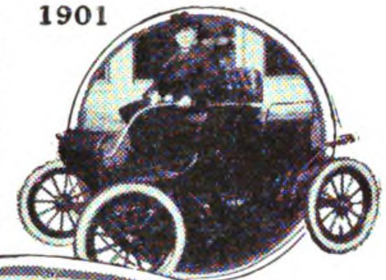
THIS is the story of a man who, for twenty years, has been as devoted to a single make of car—as Damon was to Pythias. It is the story of a record-breaking fidelity, of ownership so ardent as to be perhaps unparalleled anywhere.

Fittingly enough, this " Damon " who is so remarkable an advertisement for the Oldsmobile motor car, is himself a noted advertising man, Mr. J. P. Muller, president of a large New York advertising agency.

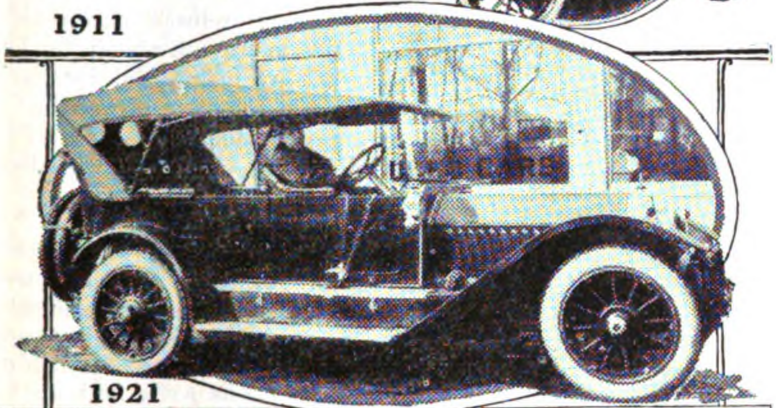
Mr. Muller has gone through two decades of Oldsmobile ownership in New York city. Although the illustrations show him in only three cars, it is nevertheless a fact that he is the only individual on the face of the earth who can claim the extraordinary distinction of having owned a car of each year's output of the Olds Motor Works.

When Mr. Muller was asked what he did with his fleet of Oldsmobiles and what use he could have for such an assortment when it was physically impossible for a man to run only one car at a time, he replied that when he bought a new one, he passed the older one along to relatives. Finally he found himself, his family and his relatives in possession of so many Oldsmobiles that the simplest way to manage his fleet was to go into the garage business.

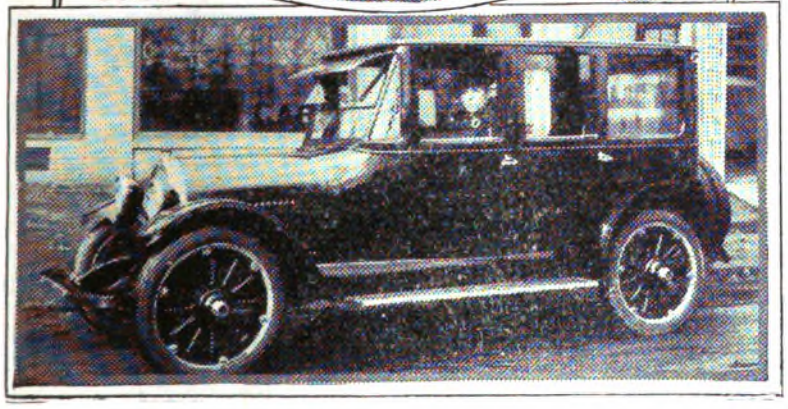
1901



1911



1921



With some associates he organized the Thoroughfare Auto Supplies, Inc., at Elmhurst, Long Island. Arrangements were made to sell Oldsmobiles and to-day the company is one of the most active in the metropolitan district.

His trio of cars, pictured here, forms an exhibition in the thoroughfare garage that has attracted widespread attention because it shows so graphically the transition through which the automobile has passed, and in which the Oldsmobile has always played a leading part.

Mr. Muller is a keen student of motordom and its affairs. At a convention held in January, Mr. Muller's speech was the subject of considerable comment in the automobile columns of the daily newspapers. He pointed out that in relative value the Oldsmobile " four " of to-day costs less than half of what the 1908 Oldsmobile brought. The older model, Mr. Muller said, had no magneto, no electric lighting equipment and no self-starter. Had this car been equipped with windshield, top, speedometer and the many other sundries which are now embodied in the modern car, its cost would have been over three times that of to-day.

It is a far cry, indeed, from the perambulator type curved dashboard Oldsmobile of 1901, which was the cynosure of all eyes wherever it appeared, to the trim, beautiful, efficient car of the present. It is an equally far cry from the 8 horse-power Oldsmobile to the 90 horse-power machine, the smallest and the largest turned out of the factory at Lansing ; but Mr. Muller still owns them both.

Periodic offers have been made him for the two older cars pictured here, but he has refused to part with them under any circumstances. He regards them as precious possessions and inasmuch as he is still in his forties, he hopes to add two or three more decades of Oldsmobiles to the exhibition.

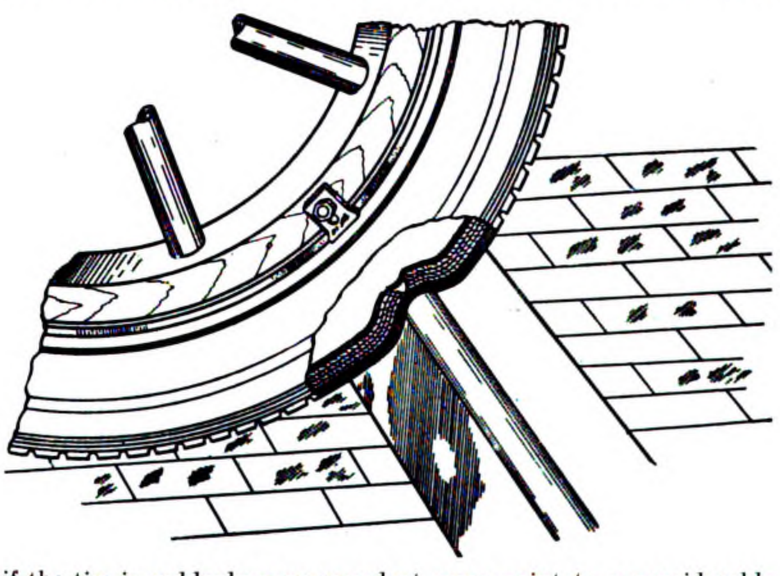
Tire Bruises

A " STONE bruise " is the term used to describe an injury to a tire caused by striking some object with sufficient force to cause the tire fabric to be broken. It need not be a stone that causes the damage.

The break in the fabric may be in only one ply or it may be in all of them : but in any case it is always the inside ply that breaks first.

An inexperienced driver whose tire gets a heavy blow from a stone or a curb usually looks over the outside of the tire to see if any damage has been done. But the old driver knows that if harm has been done the place to look for it is in the inside and that any break in the fabric will be registered on the inside ply first.

Normally the inside ply is shorter than the rest and each ply is shorter than any of the others which are located outside of it. This is because it is on the inside of the curvature of the tire. Now



if the tire is suddenly compressed at some point to a considerable extent, such as shown in the illustration, the relative position of the plies is reversed, that is, the outside ply becomes, at this particular point, the inside ply as regards the curvature and the inside ply becomes the outside ply, as regards curvature.

This has the effect of stretching the inside ply more than any of the others, and, of course, if the amount of stretch is very great, the fabric will be broken.

If it should happen, as it often does, that only one or two inner plies are broken, there will not be any signs of the injury on the outside until a considerable time afterward. This is because the other plies still unbroken will continue to hold against the air pressure even though they will be under excessive strain. But continued flexing will eventually break them also and the result

may be a blow-out which may occur at any time, even on a perfectly smooth pavement.

Another effect of a break in one or two inner plies may be that from continued bending the broken edges of the fabric rub a hole in the inner tube at that point. Sometimes the break is so pronounced, especially in a fabric tire, that the air pressure forces the inner tube into the break, and as this is continually closing and opening, as the tire rolls, the action is like a pair of pinchers and cuts the tube.

If the tube is chafed through or cut after a bruise, such as described, the air will pass directly through the carcass and force the rubber covering, and sometimes the tread, loose from the fabric. When this happens the user generally terms it a blow-out and as a matter of fact it is; but contrary to the opinion often held, it is seldom the result of a defect in manufacture. It can generally be traced to an injury sustained some time prior to the final breaking down of the tire.

Motor Coaches for the Manila Railway

AUTO truck competition has increased to such an alarming rate with the service of the Manila Railway Company, especially in the districts adjacent to Manila, that the railway is being hard pressed to cover expenses. The lack of supervision over auto trucks by the public utility commission makes the competition extremely severe and one which can only be met by reducing the fares or providing more frequent and cheaper transportation. The board of directors of the railway, therefore, recommend the use of motor propelled coaches on designated rail lines. The company has started an auto truck service of its own between Noveleta and San Roque in the province of Cavite with two trucks. From March 1921 when the first truck was placed in operation and May when the second was placed on the run, the two trucks handled 49,170 passengers with receipts of Pesos 9,834 and expenses of Pesos 10,212, which does not include depreciation and interest on the investment. The present fare of 20 centavos is to be increased.

Motor Transport in Malaya

A CORRESPONDENT, writing to *Motor Transport*, points out that considerable expansion is taking place in the motor trade with Malaya, owing to new road construction. A considerable demand exists for motor vehicles, including cars, motor cycles and trucks, although depression in the rubber market has affected purchasers to a certain extent, but the present conditions of the trade are merely temporary, and on the whole are favorable to British suppliers.

Prices, quality, and appearance influence the choice of Eastern motor buyers; but light, serviceable vehicles are the best sellers. With a stablished market, expansion of business will follow. The value of this market to the British motor industry is beyond dispute. The field for enterprise is a British colony, and although United States agents are active, there is a preference for our products. If our manufacturers will study the tastes of the Chinese community, amongst which the readiest purchasers of machines are found, they will compete successfully with the medium priced United States vehicles.

Trucks find a ready sale, and are largely used in Singapore for moving goods, and also for motor 'bus service and they may be seen far out in country districts, shifting marketable produce and conveying passengers, to the increasing exclusion of the primitive bullock carts. The motor 'buses in use are chiefly on $1\frac{1}{2}$ and 2-ton chassis, and regular services are maintained between Kuala Lumpur, Raub and Kuala Lipis in the state of Penang—a distance of 120 miles, chiefly over mountain roads—and they radiate from Kuala Lumpur in all directions, competing with the railways.

Only light cars and trucks are in demand; few 5-ton, and no 10-ton trucks are used in the colony, owing to the character of the roads, and to the fact that light trucks are more economical, their prime cost being less, whilst they are capable of more continuous operation.

SOCONY AUTO OILS

SO
SOCONY
TRADE MARK
N Y
美孚行
STANDARD OIL CO. OF NEW YORK

Are manufactured for a simple purpose . . . to lubricate automobile engines.
The rich lubricating qualities of our oils afford perfect lubrication to the wearing parts.
Not only is this true in summer, it is equally true in Midwinter.
We have four grades of Auto Oils to meet every condition and requirement of the motorist.

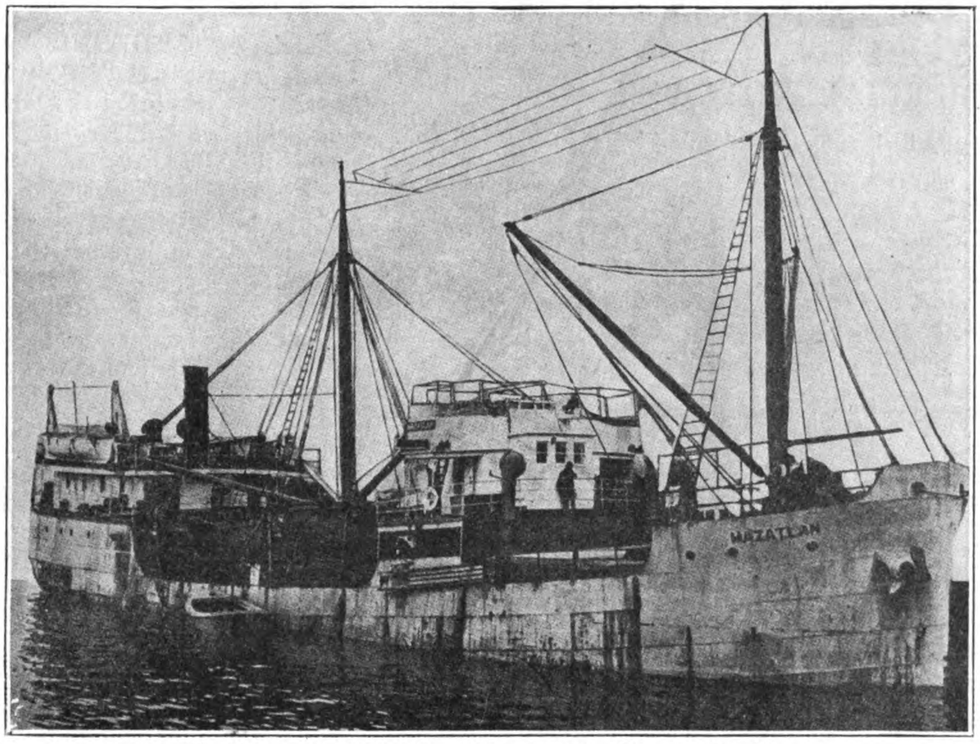
Auto X Light
,, XX Medium
,, XXX Heavy
,, XXX E. V. Extra Heavy

Obtainable at any Garage in China

Motor Vessels Developing Siberian Trade

IT is probably not realized generally that the development of the motor vessel is making possible the opening of a vast trade between Puget Sound and Siberia, says Donald Harris in the *Pacific Motor Boat*, but this is nevertheless true. It is probable that without the economical transportation which the motor vessel is able to afford, this great commerce, which is only now in its infancy, would not have been developed.

Motorships are peculiarly adapted to Siberian coast commerce and fur-trading needs. R. S. Pollister of Olaf Swenson & Co., the new Russian-American combine, with headquarters in Seattle, which is behind the development of much of the Siberian trade, states that the cruises of 15,000 to 20,000 miles made by fur-trading vessels during a season, in regions without fuel bases, require the increased cruising radius which the compactness of oil fuel gives and which the steam vessel lacks. Oil engines have been found thoroughly suited to Arctic trips by this company. Motorships are rapidly becoming universal in fur-trading, and will find more and more employment as the rich trade possibilities of the Siberian coast are developed.



The Motorship "Mazatlan," fitted out for Siberian Trading

The motorship *Mazatlan*, owned by this company, left April 8th for the Kamchatka peninsula, with a $400,000 cargo of general merchandise to supply the company's numerous stations and to use in trading with independent trappers. She and her smaller sister ship, *Chokotsk*, will cover the entire Kamchatka peninsula, the Okhotsk Sea and the Arctic coast of Siberia.

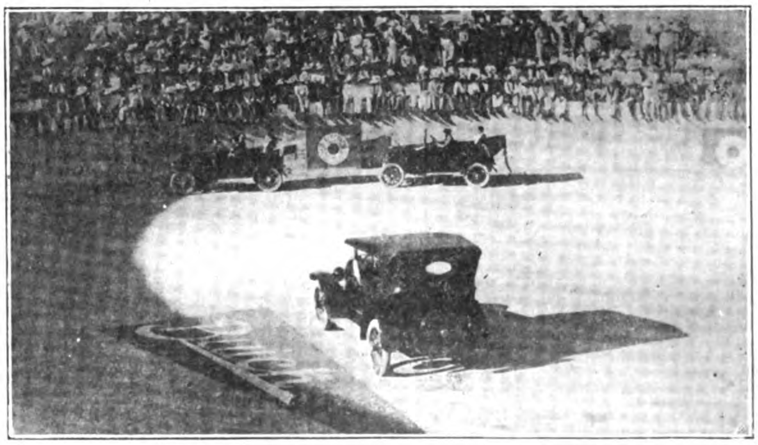
The *Mazatlan* is 987 tons gross in weight, and carries a 1,500-ton cargo. She is 180 feet long, 37 feet in beam and has a draught of 16½ feet. Fuel oil is carried in her double bottom, her capacity being 1,370 barrels. Her speed is approximately 250 miles a day, and a day's fuel consumption 23 barrels. This will enable her to cover her 15,000 miles in about two months without taking on more fuel. She is powered with two 400 h.p. Winton full Diesel engines, and has two 60 h.p. Fairbanks-Morse auxiliary engines.

She also carries three 25-foot power tenders equipped with 24 to 30 h.p. Kahlenberg engines. The Siberian coast is so rough that goods usually must be landed through the surf. Moreover, thousands of miles in short side-trips are saved by the use of such tenders. Six other power tenders, ranging from 9 to 25 feet, and with Kahlenberg and Lathrop engines of 20 to 30 h.p. are being taken overseas to sell.

The *Mazatlan's* forward hold is fitted out like a store, so that independent trappers dealt with may come aboard and select goods as they might at a shop. Heretofore, such cargoes have been carried in boxes just as received from factories and wholesalers. Three sides of this hold are lined with huge shelves arranged in compartments in which a great variety of trading goods is arranged for inspection.

The *Chokotsk*, a 110-ton vessel, will be sent out by Olaf Swenson & Co. about the first of May. She will cover the company's northernmost territory, north of Kamchatka, running into the Arctic Ocean as far as the Kolyma River. The purse seiner, *Blue Sea*, will follow her about the middle of May, and will winter in the Kolyma River. Both of these vessels are powered with Fairbanks-Morse engines, the *Chokotsk* with a 140 h.p. engine, and the *Blue Sea* with one of 45 h.p.

Prince Consort Henry of the Netherlands entering a Chevrolet Sedan on his visit to the province of Zeeland. The Prince's visit was made to lay the cornerstone of a monument commemorating the losses suffered through the recent inundations of the district by heavy storms opening the dikes.


A unique motor car advertisement, staged during the procession around the ring that preceded a recent *corrida de toros* at Queretaro, Mexico. A new Buick car on the floor of the arena is the centre of attention.

FURTHER BIG REDUCTIONS

DENNIS

COMMERCIAL MOTORS

Practically back to Pre-War Prices

Type	To-day's Price	Price Jan., 1921	Reduction
2-2½-ton Standard Lorry Chassis...	**£730**	£ 997	***£267***
2-2½-ton Long Char-a-bane Chassis	**£750**	£1,007	***£257***
3½-4-ton Lorry Chassis	**£865**	£1,195	***£330***
3½-4-ton Char-a-bane Chassis ...	**£880**	£1,190	***£310***
4-ton Long Wheelbase Omnibus Chassis	**£950**	£1,200	***£350***
5-6-ton Lorry Chassis	**£960**	£1,320	***£370***

The prices given above are F.O.B. Guildford, England

WITH a view to stimulating trade and maintaining employment, we have written down our Stocks to a figure very much under cost, and this, with the wages reductions that will take place in the near future, has enabled us to sell our Chassis as from October 1st at the prices mentioned opposite.

Purchasers of "DENNIS" vehicles, even at such low prices, can feel perfectly assured that they are acquiring absolutely new goods of latest and most improved construction, as Dennis Brothers have never purchased or taken back second-hand War Lorries. The Vehicles we are offering are absolutely new and embody improvements on previous models. We have been able to keep our factory busy on new productions, and are not selling Chassis made two to six years ago and re-purchased from the Government, nor are we offering re-conditioned War Chassis.

WRITE FOR PARTICULARS:—

Agents:

Messrs. Wearne Brothers, Ltd., 310 Orchard Road, Singapore.
Messrs. Perrin Cooper & Co., Consular Road, Tientsin.
Messrs. Central Garage Co., 9 Hongkong Road, Shanghai.
Messrs. Alex Ross & Co., Ltd., Machinery Department, Hongkong.
Messrs. Fikkert Motor Car Co., Weltevreden, Batavia.

Cables: A.B.C. 5th Edition, Lieber's, Bentley's, Marconi.

DENNIS BROS., LTD.

GUILDFORD, ENGLAND

D 221

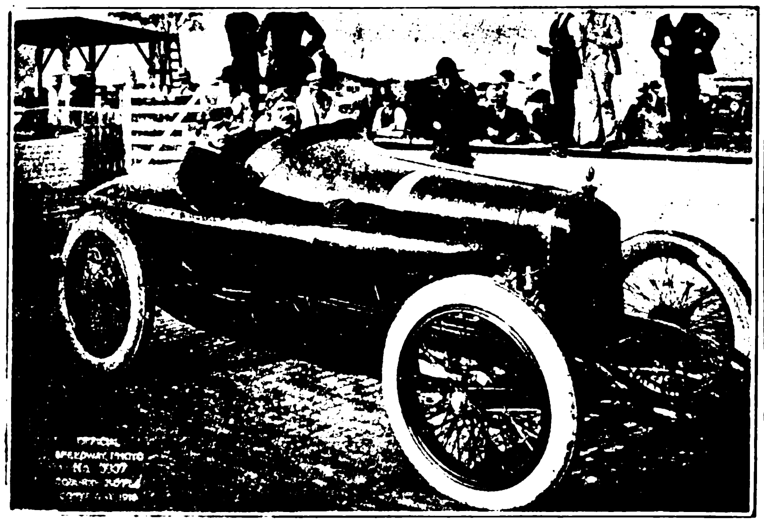
Graphite Transmission and Differential Grease No. 677

We are proud to state that No. 677 has justified the labor and expense devoted to a really intelligent effort to produce an ideal gear lubricant. It has successfully stood the test of years. There is nothing like it on the market. It is the grease the "Speed Kings" use.

No. 677 is graphited grease of medium density that flows over the gears like an oil, yet possesses the peculiar property of not settling when the gears are not in motion. It reaches all the bearings and provides a graphite coating that prevents wear, reduces friction and causes cool running at all times. No. 677 remains unchanged in hot or cold weather. It will last far longer than the best plain grease.

No. 677 is recommended for transmissions and differentials, except those designed for light oil lubrication. The consistency is about that of heavy gear oil. It is also the most satisfactory lubricant for electric gear shift mechanisms, the reverse gears of power boats, and for change-speed gear boxes of motorcycles.

Sold in one, five and ten pound tins. Larger packages if desired.



"Many times Dixon's Graphite Automobile Lubricants have pulled my car through a trying race without lubricating difficulty."—LOUIS CHEVROLET.

Made in Jersey City, N.J., by the

Joseph Dixon Crucible Co.

Established, 1827

For Prices, Information, etc., communicate with

HENRY KATTEN

22 KIUKIANG ROAD
SHANGHAI, CHINA

Graphite Cup Greases

Cup Greases containing fine flake graphite reduce friction to a minimum. By using these high-grade graphited greases, bearings soon acquire the well-known graphite polish that eliminates friction and causes easy running. Used in all grease cups, wheel spindles, etc.

Dixon's Graphite Cup Grease No. 3 is recommended, except in warm climates, where No. 5 is more suitable. The consistency of each grade changes but little under wide temperature variation.

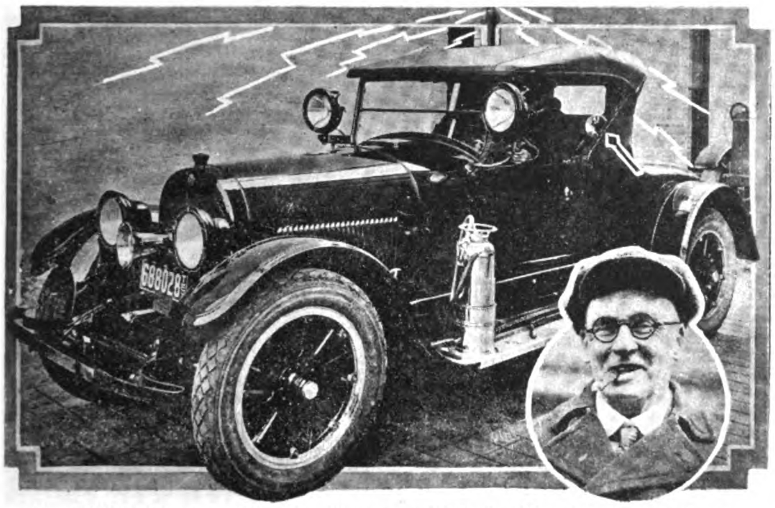
The importance of attending to the numerous small bearings and moving parts of cars is frequently overlooked. Wherever you see a grease cup don't think it is put on as an ornament, but give it a turn once a day or once a week according to the requirements. Don't forget to keep the cups filled with grease.

Sold in one, five and ten pound tins. Larger packages if desired.

Fires Soon Mastered with Aid of Cadillac Radio Roadster

FIRE-fighting and fire-signalling equipment seems to have reached the acme of its development, when one considers the huge motor-driven machines, with their loads of ladders and their squads of trained firemen, which plunge down the streets of any large city as soon as the alarm bell sounds from the fire-station tower.

Within the last few months, however, Fire Chief Garrett of Dallas, U.S.A., has developed an entirely new and effective method



Fire Chief Garrett of Dallas, Texas, and his Cadillac Radio Roadster

of keeping in touch with incipient blazes, that bids fair to be adopted by fire chiefs of other cities as well.

This scheme of Chief Garrett's is embodied in the Cadillac radio roadster—a standard Cadillac type 61 car equipped with wireless telephone attachment, in which the Dallas fire chief travels about the city.

A short time ago it was visibly brought home to a Dallas observer how Chief Garrett, by means of his radio roadster, could keep closely in touch at all times with fires and their location.

The red Cadillac roadster, with its big headlights, its wireless mast and Babcock fire extinguishers, was seen moderately jogging down one of the main streets of Dallas. All at once the car was seen to come to an immediate stop—the gears were thrown into reverse and it swerved about. Then with a strident yowl from its big warning signal, it dashed away in the opposite direction.

Within another minute the sound of a fire alarm, tapping out on the central station bell, was heard.

Chief Garrett had received the information of the fire and the location of the alarm before the machinery which set the bell to tapping could be put into operation.

The receiving apparatus of the Cadillac radio roadster is neatly and compactly tucked away in a black box behind the driver's seat, and the wireless messages are sounded from a horn close by the driver's ear.

Chief Garrett is very modest in describing the successful operation of his fire-detecting mechanism. He says:

"There isn't much to that; its simple. All you do is tune up and the man at the central office just talks into the transmitter, and it comes out through this horn. It isn't any trouble to hear what he says."

The Rarity of Air Travel Accidents

BRITISH publications, from all indications, are certainly behind aviation and are doing their utmost to encourage the industry. The recent collision of two air expresses on the London to Paris airway which resulted in the loss of six lives, has occasioned editorial comment on the part of several publications wherein the comparatively few airplane accidents in relation to the considerable number of flights made was pointed out.

The *Illustrated London News*, in this connection, devotes an entire page in its issue of April 22nd, to a graphic chart showing the extent to which commercial aviation was operated between different countries in Europe during the years 1920 and 1921. From this chart the following pertinent data is gleaned :—

	Continental Flights			
	Number of Flights		Passengers Carried	
	1920	1921	1920	1921
British machines	2,854	993	5,799	5,256
French machines	657	1,565	486	4,352
Belgian machines	104	421	98	630
Dutch machines..	5	366	0	480
By others	0		0	13
Grand total of flights and passengers carried to and from England	3,620	3,345	6,383	10,731

Goods transported by air—1920—imported total values £677,-047, exported total values £351,765; 1921—imported £375,474, exported £195,826 (Britain).

Accidents in British civil aviation (including continental routes :—

Year 1920—out of 42,296 passengers (mileage 546,400m.) 14 killed, 15 injured.

Year 1921—out of 42,680 passengers (mileage 452,000m.) 3 killed, 6 injured.

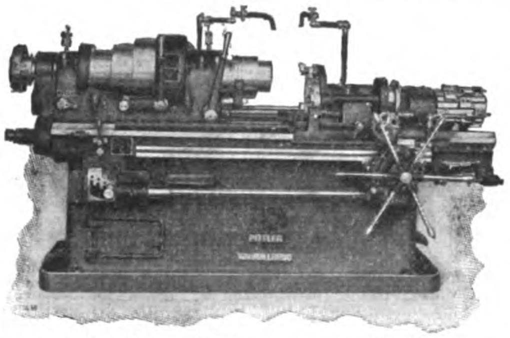
The totals of British civil aviation flights are (for 1920) 26,803 flights, (for 1921) 23,152.

It will be noted from the above that there was a decided falling off in the number of flights made in British machines during 1921 as compared with the preceding year, though in the matter of passengers carried the disparity is not so great, the number in 1921 being 543 less than that in 1920. To offset this, however, a considerable increase in flights and passengers carried by French, Belgian and Dutch machines is shown for 1921 as compared with the 1920 figures. Of much significance are the statistics on accidents, for although the number of passengers taking flights in airplanes during 1921 exceeded the number carried during 1920, only 3 were killed and 6 injured during 1921 as against 14 killed and 15 injured in 1920, indicating that great strides have been made in the matter of making the airplane a safe means of rapid transportation.

A scene in the mountain-crests of Chile, at the tremendous height of 15,500 feet—nearly three miles above sea level. The car shown is an Oakland. It operates regularly in the highly-rarified mountain atmosphere, being used by the Pederosa Mining Co., Ltd., who describe it as "a powerful and wonderful car"

The

PITTLER TURRET LATHE



One of the Factors of German Industrial Efficiency

Catalogue containing valuable information about up-to-date machining methods free on request

PITTLER

Werkzeugmaschinenfabrik A.-G.

LEIPZIG - WAHREN

Makers of: Genuine Pittler Turret Lathes, Single-spindle and Multiple-spindle, Automatic Screw Machines, Automatic Pin and Stud Lathes, Self-opening Die-Heads

THE FAR EASTERN MANUAL
of
FINANCE and INDUSTRY, 1923

Eastern Asia is the battleground for world trade supremacy. The largest and most profitable fields for investment and commercial expansion lie beyond the western shores of the Pacific. Accurate knowledge of the Finances and Industries of these countries is the first essential to successful and profitable trade.

THE FAR EASTERN MANUAL of Finance and Industry is being compiled, in order to meet this growing demand for reliable information on the industries, machinery users and financial institutions in this part of the world. The book will contain over 1,500 pages of solid reports, including numerous maps of railways, tramway systems and mining areas.

HAVE YOU SUBSCRIBED?

PRICE $25.00

PUBLISHED BY

THE FAR EASTERN REVIEW

SHANGHAI—CHINA

CREOSOTED TIES

OF

PHILIPPINE TIMBER

FOR

RAILROADS

ATLANTIC, GULF & PACIFIC CO. OF MANILA

77 Muelle de la Industria — Manila, P.I.

Cable Address: "DREDGING"

Amoy
Antung
Canton
Changsha
Chefoo
Chinkiang
Dairen (Dalny)
Foochow
Hankow
Harbin
Hongkong

BUTTERFIELD & SWIRE

(JOHN SWIRE & SONS, LTD.),
FRENCH BUND, SHANGHAI
Telephone No. Central 4881
AGENTS FOR

Ichang
Kiukiang
Kobe
Nanking
Newchwang
Ningpo
Shanghai
Swatow
Tientsin
Tsingtau
Wuhu
Yokohama

The Blue Funnel Line

(Ocean S.S. Co., Ltd. & China Mutual S. N. Co., Ltd.)

Fast Services

Japan, China, Hongkong, Philippines, Straits and Java to Europe via Suez Canal and to New York via Suez and Panama Canals also

Trans-Pacific between Oriental ports and West Coast of N. America.

CHINA NAVIGATION CO., LTD.

Passenger and Freight Steamship Services

SHANGHAI TO, AND FROM,

Weihaiwei, Chefoo and Tientsin (for Peking); Newchwang: Antung.

Hankow, Ichang (with connection to Chungking), Changsha, and Intermediate Yangtsze Ports.

Hongkong and Canton; Amoy and Swatow; Ningpo; and General Coasting Services.

HONGKONG TO, AND FROM,

Manila, Cebu, and Iloilo

Weihaiwei, Chefoo and Tientsin (for Peking)

Canton; Hoihow, Pakhoi and Haiphong; Bangkok and Singapore.

Shanghai and Yangtze Ports (as above)

Sydney, Melbourne and Australian Ports (Australian-Oriental Line)

Taikoo Sugar Refining Co., Ltd.

FINEST CANE SUGARS

Taikoo Dockyard & Engineering Company of Hongkong Ltd.

Ship Builders, Ship Repairers, Engine Builders, Boiler Makers, etc.

Fire and Marine Insurance

Fire

London and Lancashire Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

Guardian Assurance Co., Ltd.

Orient Insurance Company.

British Traders Insurance Co., Ltd.

Marine

British and Foreign Marine Insurance Co., Ltd.

Standard Marine Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

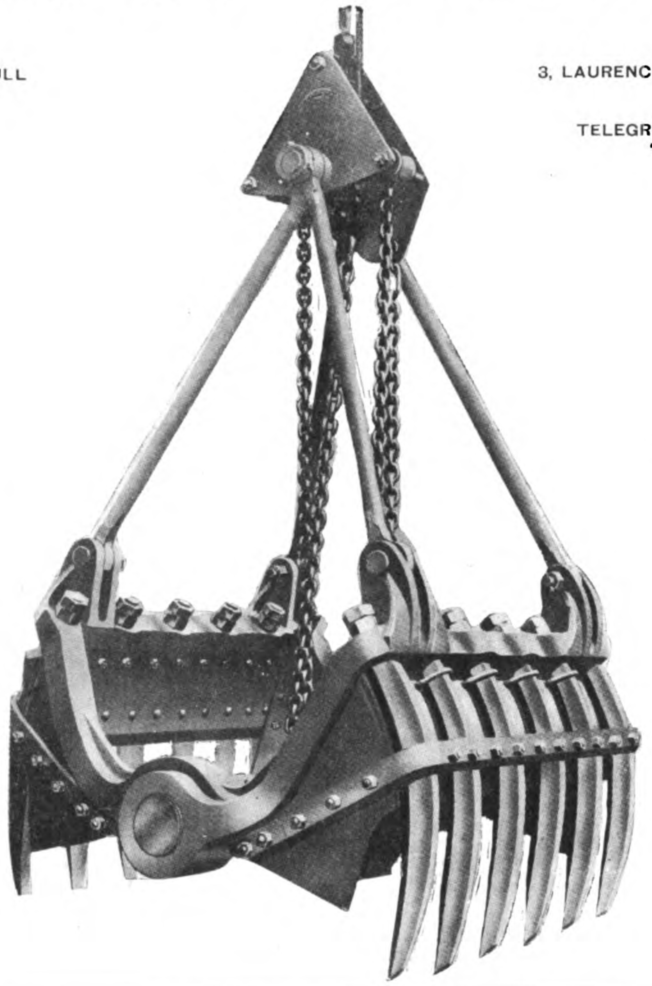
Sea Insurance Co., Ltd.

Guardian Assurance Co., Ltd.

PRIESTMAN BROS., LTD.

WORKS:
HOLDERNESS FOUNDRY, HULL

LONDON OFFICE:
3, LAURENCE POUNTNEY HILL, CANNON STREET, LONDON, E.C.
TELEGRAMS: "PRIESTMAN, HULL" AND "PRIESTMAN, LONDON."



150

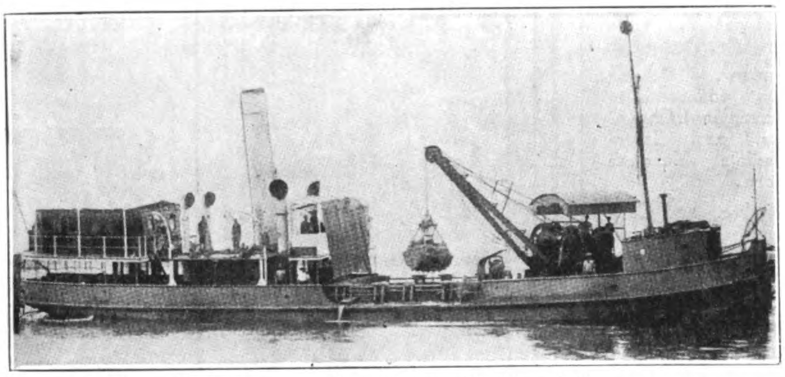
Different Types and Sizes of

GRABS

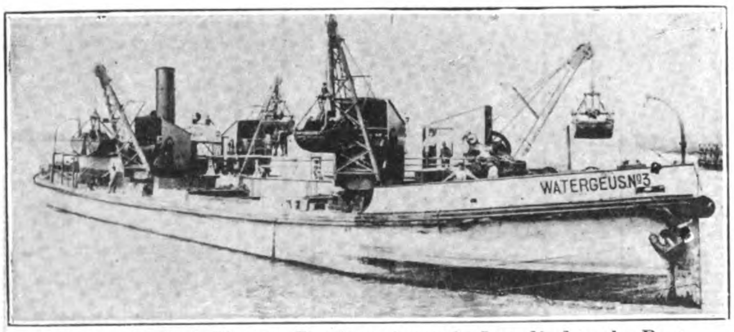
for
Dredging, Raising Blasted Rock, Excavating, Trench Cutting, Discharging Coal, Iron Ore, etc.

The Priestman System

has been Adopted by 24 Governments and all the Leading Railway Companies, Dock Companies and Contractors of Great Britain



One of 38 Grab Dredgers Supplied for the British Government



Quadruple Grab Hopper Dredger Recently Supplied to the Port of Antwerp. Output, 800 tons per hour

Grab Hopper Dredger Supplied to the River Moy Commissioners

MIDDLETON & CO., LTD.

AGENTS FOR CHINA
2B KIUKIANG ROAD, SHANGHAI

Your American Trip

How successful, and how enjoyable, your American trip will be, depends to no small extent upon what hotels you select in the cities you visit.

YOU will go to New York, of course. Do you know about Hotel Pennsylvania (the largest hotel in the world), and the comforts and conveniences it can offer you? The advantages of living at the Pennsylvania are so many, and so obvious, that it entertains more guests from the Orient, than any other first-class hotel in the city—probably more than any half-dozen others!

Under the same direction as the Pennsylvania are the HOTELS STATLER in four other big American cities, some or all of which you will be almost certain to visit. Make hotel reservations before you leave home, specifying these good hotels.

You can reserve through any office of Messrs. Thos. Cook & Sons (who can also give you descriptive literature) or by writing direct to the hotels.

Hotels Statler

BUFFALO 450 Rooms 450 Baths **DETROIT** 1000 Rooms 1000 Baths **CLEVELAND** 1000 Rooms 1000 Baths **ST. LOUIS** 650 Rooms 650 Baths

In all the Statler-operated hotels every room has private bath and many other unusual conveniences. Any one of these hotels will make reservations for you at all the others, and see that you are properly introduced.

Hotel Pennsylvania

NEW YORK

Opp. Pennsylvania Terminal—**The Largest Hotel in the World**—2200 Rooms, 2200 Baths

NIPPON MENKWA
KABUSHIKI KAISHA

(THE JAPAN COTTON TRADING CO., LTD.)

LARGEST IMPORTERS AND EXPORTERS
IN THE FAR EAST

COTTON
COTTON YARN
COTTON PIECE GOODS
RAW SILK
WOOL
GENERAL COMMISSION MERCHANTS

Established 1892

HEAD OFFICE: No. 10 2-Chome, Nakanoshima, OSAKA, JAPAN
SHANGHAI OFFICE: 8 Hankow Road
TIENTSIN OFFICE: 42 Rue de France, French Concession

Capital Subscribed- - - - - - - - - - - -	Yen 50,000,000.00
Capital paid-up - - - - - - - - - - - -	Yen 20,250,000.00
Reserve Funds - - - - - - - - - - - -	Yen 26,825,000.00

MATAZO KITA, Esq., *President*
ATUSHI YAMADA, Esq., *Vice-President*

Directors :

K. SUYEYOSHI, Esq. G. IMAMURA, Esq. R. NAKAMURA, Esq.
H. OHOKA, Esq. T. SHIKATA, Esq. K. KUSUMOTO, Esq.
T. YASUI, Esq.

BRANCHES: Semba (Local), Dairen, Shanghai, Hankow and Bombay

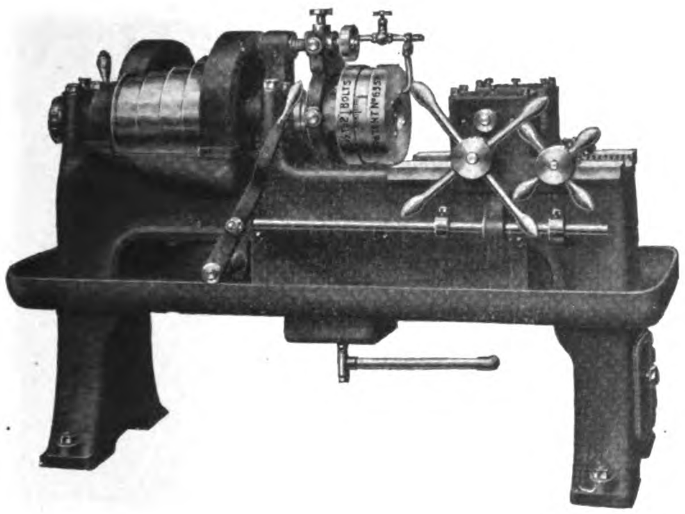
AGENCIES: Kobe, Yokohama, Tokyo, Seito, Tientsin, Newchwang, Tiehling, Changchung, Harbin, Hongkong, Calcutta, Karachi, Rangoon, Alexandria, Liverpool, New York and Buenos Aires

SOLE BUYING AGENCY IN U.S.A.: Japan Cotton Trading Company of Texas, Fort Worth, Texas

SOLE BUYING AGENCY IN COREA: Corea Cotton Trading Company, Limited

FACTORIES: Cotton Press at Hankow, Cotton Gins and Presses in India

Heap's Patent Screwing Machines



are made in all sizes, and suitable for dealing with all classes of work.

The illustration opposite shows our 2in. Patent Automatic Bolt Screwing Machine which is one of a complete line of Single and Multiple Head Machines specially designed for use wherever large quantities of Bolts have to be dealt with in the most expeditious and economical manner.

We will gladly advise you as to the most suitable machine for your particular class of work.

Catalogue free on request.

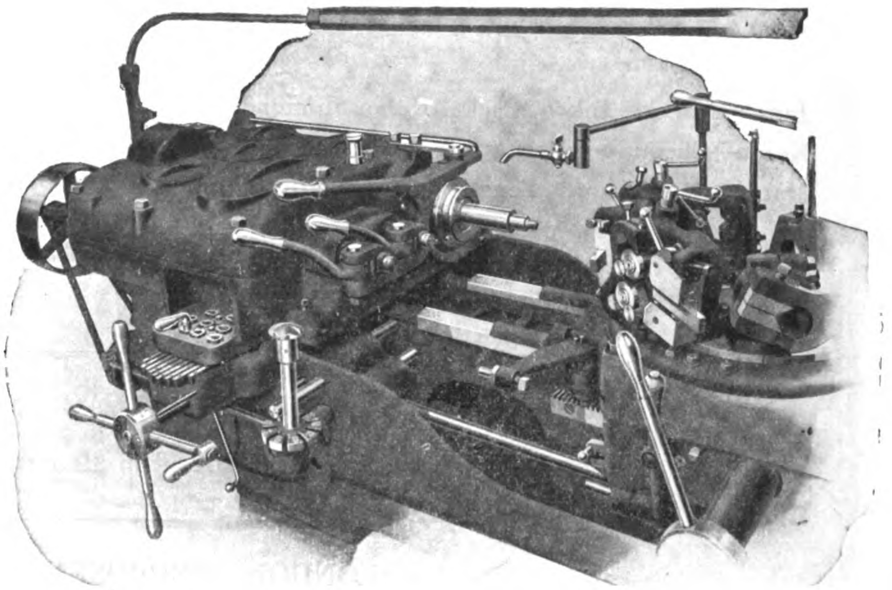
JOSHUA HEAP & CO., LTD.,

ASHTON-UNDER-LYNE, ENGLAND.

THE TOOLS AND THE WORK

Output depends on *rigidity*. *Accuracy* depends on *rigidity*. The *essential point* of rigidity in a tool *is the rigidity* with which the *cutting edge* of the tool and *the work* are held with relation to each other. Rigidity in other particulars is non-essential.

The Flat Turret Lathe is designed with an eye single to being *rigid at the right points*. The flat turret, with its slide gibbed directly to the bed, the cross sliding head with a broad spreading bearing on the bed, the self-contained design of the tool holders, the arrangement of the stops, *and every other feature of the machine, work toward this one end*. And this end is reached to its degree *not attained by any other machine*.



Jones & Lamson Machine Company

9-10 Water Lane, London, England
Cable Address: "Turretorum" London

Springfield, Vermont, U.S.A.
Cable Address: "Turret" Springfield, Vt.

THE BANK OF CHOSEN

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor: S. Minobe, Esq.
Deputy-Governor: T. Kano, Esq.

Directors:

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT: TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY:

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE:

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL AND SURPLUS - - - - U.S. $10,000,000
UNDIVIDED PROFITS - - - - 5,400,000
RESERVE FOR DIVIDENDS - - - 600,000

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK

LONDON OFFICE: 36 BISHOPSGATE, E.C.

LYONS OFFICE: 27 PLACE TOLOZAN

SAN FRANCISCO OFFICE: 232 MONTGOMERY STREET

BRANCHES:

CHINA
SHANGHAI
PEKING
TIENTSIN
HANKOW
HARBIN
HONGKONG
CANTON

DOMINICA
SANTO DOMINGO
SANCHEZ
SAN FRANCISCO
SAN PEDRO
SANTIAGO
PUERTO PLATA
BARAHONA
LA VEGA

INDIA
BOMBAY
CALCUTTA
RANGOON

JAPAN
YOKOHAMA
KOBE

JAVA
BATAVIA
SOURABAYA

PANAMA
PANAMA
COLON

PHILIPPINES
MANILA
CEBU

SPAIN
BARCELONA
MADRID

STRAITS SETTLEMENTS
SINGAPORE

We are also able to offer our Customers the services of the Branches of the National City Bank of New York in the principal countries of South America, Central America and in the West Indies.

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current Accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

H. C. GULLAND, *Manager.*

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital ...	**Frs. 72,000,000**
Reserves ...	**„ 70,000,000**

HEAD OFFICE: 15 BIS RUE LAFFITTE, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Nouméa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

JUGO GINKO, LIMITED

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugo Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-up Y. 49,750,000 Reserve Funds Y. 23,900,000

***President*: The Hon. Iwao Matsukata *Vice-President*: Masayasu Naruse, Esq.**

***Managing Directors*: Yutsuha Sato, Esq. and Kanesato Aiko, Esq.**

***Head Office Manager*: Sei Usagawa, Esq.**

***Head Office*: No. 6, 7chome, Kobiki-cho, Kyobashiku, Tokyo.**

BRANCHES:

SHIMBASHI, MARUNOUCHI, GOFUKUBASHI, TOHORISANCHOME, KAKIGARACHO, NINGYOCHO, RYOGOKU, FUKAGAWA, KANDA (TOKYO). OSAKA, SENBA, TAMATSUKURI, NISHI, KUJO, MINAMI, NAMBA, TENNOJI, KITA, TENGACHAYA (OSAKA), KOBE, SAKAEMACHI, FUKIAI, HYOGO (KOBE). KYOTO, NAGOYA, SAKAI, WAKAYAMA, NISHINOMIYA, OKAYAMA, HIROSHIMA, SHIMONOSEKI, FUKUOKA, KUMAMOTO, KAGOSHIMA, SENDAI.

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD. LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD. UNION DISCOUNT CO. OF LONDON, LTD.

THE BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - - - Yen 60,000,000
Capital Paid-up - - - - - - - „ 45,000,000
Reserve Funds - - - - - - - „ 9,680,000

President: KOJURO NAKAGAWA, Esq. Vice-President: SHUNROKURO MORI, Esq.

DIRECTORS:

TSUNEKICHI IKEDA, Esq.
GUNJI KAWASAKI, Esq.
TADASU HISAMUNE, Esq.
KUMEMATSU MORINAGA, Esq.
MASUMI ESAKI, Esq.

Head Office: **TAIPEH, FORMOSA (TAIWAN)**

BRANCHES:

JAPAN: Tokio (General Affairs Department), Kobe, Moji, Osaka, Yokohama.
TAIWAN: Keelung, Tainan, Takow, and 11 other points.
CHINA: Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

AGENTS AND CORRESPONDENTS:

In the Principal Cities and Towns throughout the World.

LONDON BANKERS:

BARCLAYS BANK, LTD. LLOYD'S BANK, LTD. LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.

TOKYO BRANCH:

No. 1, Eiraku-cho Ni-chome, Kojimachi-ku.

Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED	- - - - -	Yen 50,000,000
CAPITAL PAID-UP	- - - - - -	Yen 45,000,000

HEAD OFFICE:

MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:

TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:

NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
KINICHI KAWAKAMI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

THE SUMITOMO GOSHI-KAISHA

OSAKA, JAPAN

OWNERS OF BESSHI COPPER MINE, COAL MINES, SILVER AND GOLD MINES, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper, Brass, Bronze and other Alloys, Solid and Drawn Steel Tubes, Nails, Etc.—Superphosphate and Composite, Manure, Sulphuric and Nitric Acid, etc.

GENERAL WAREHOUSE AND BANKING BUSINESS

WORKS AND DEPARTMENTS

Warehouses ... ... Osaka, Kobe & Tokyo
Mining Offices ... ... Besshi, Wakamatsu, Sapporo & Ohgayu
WORKS:
Copper Works ... ... Osaka & Amagasaki
Fertilizer Works ... ... Niihama
Sales Departments ... ... Osaka, Kobe, Tokyo, Kure, Yokosuka, Hakata, Shanghai, Hankow and Tientsin

THE SUMITOMO STEEL WORKS, LTD.

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of Every Description for Railways, Shipbuilding Yards, Mines, Hydraulic Electric and Other Engineering Works, etc., etc.

THE SUMITOMO ELECTRIC & CABLE WORKS, LIMITED

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Copper, Brass, Bronze and Nickel Wires and Strips, Trolley Wires, Insulated Wires and Cables of Every Description for Telephone, Telegraph, Lighting, Power Transmission, etc., etc.

THE SUMITOMO BANK, LIMITED

Head Office: OSAKA, JAPAN
Cable Address: "SUMITBANK"
President: Baron K. SUMITOMO
Established March, 1912
(Successors to The SUMITOMO BANK)

Capital Subscribed ... ... Yen 70,000,000
Capital Paid-up ... ... „ 50,000,000
Reserve Fund ... ... Yen 22,500,000
Deposits ... ... „ 369,000,000

Head Office: Kitahama, Osaka
City Offices: Semba, Bingomachi, Nakanoshima, Dotonbori, Kawaguchi, Tenma, Nipponbashi.
Home Branches: Tokyo (Tokyo, Toriaburacho, Fukagawa, Shinbashi, Asakusa), Yokohama, Nagoya, Kyoto (Kyoto and Nishijin), Kobe (Kobe and Hyogo), Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Wakamatsu, Kokura, Hakata and Kurume.

Foreign Branches: Shanghai, Hankow, Bombay, London, New York and San Francisco.

Agents: The Sumitomo Bank of Hawaii, Ltd., Honolulu, Lloyds Bank, Ltd., London, National City Bank of New York, New York.

Correspondents: In all important places at home and abroad.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

CHAIRMAN:

Mr. Manzo Kushida

MANAGING DIRECTORS:

Mr. Mikitaro Kikuchi Mr. Kiyoshi Sejimo
Mr. Takeo Kato

HEAD OFFICE:

No. 3 Yayesucho Nichome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

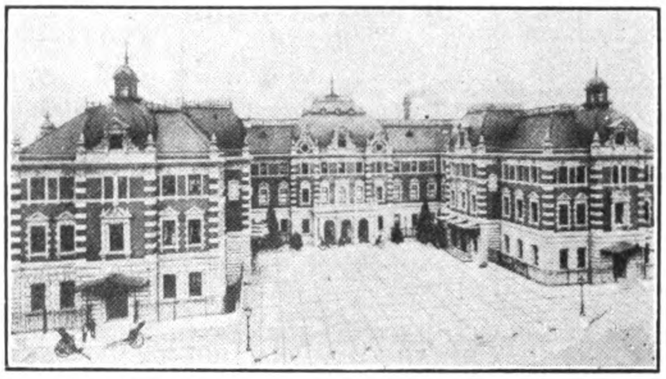
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Semba (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for the Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed.................Y. 100,000,000.00
Capital Paid-Up.....................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

NIHONBASHI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.
New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.
Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.
Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital	- - -	**Yen 50,000,000.00**
Paid-Up Capital	- - - -	**Yen 36,350,000.00**
Reserve Fund	- - - -	**Yen 31,500,000.00**

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:

No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.

T. AKASHI, *Manager*

CITY BRANCHES:

ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:

YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:

SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London:
- London County Westminster & Parr's Bank, Ltd.
- The London Joint City & Midland Bank, Ltd.
- The Yokohama Specie Bank, Ltd.

New York:
- The National City Bank of New York.
- The National Bank of Commerce in New York.
- The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:

The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE ONE HUNDREDTH BANK, LTD.

(DAI HYAKU GINKO)

HEAD OFFICE, AWOMONO-CHO, TOKYO

TOKYO BRANCHES: **No. 1 Torihatagocho, Nihonbashi: No. 10, Ginza Nichome, Kyobashi**
YOKOHAMA BRANCH: **Nos. 53-55 Honcho Shichome**
OSAKA BRANCH: **28 Bingo-machi, Nichome**
KYOTO BRANCH: **Shijo Higashinotoin**
SHINMACHI BRANCH: **Shinmachi Dori Sanchome**

President: K. IKEDA, Esq.

Managing Director: S. CHOH, Esq.

SUBSCRIBED CAPITAL	- - - - -	**Yen 25,000,000**
CAPITAL PAID-UP	- - - - - -	**Yen 17,500,000**
RESERVE FUND	- - - - - -	**Yen 8,094,340**
DEPOSITS	- - - - - - - -	**Yen 110,740,264**

Transacts General Banking and Foreign Exchange Business. Conducts Trust Company Business

Hongkong and Shanghai Banking Corporation

Paid-up Capital	... ...	$20,000,000
Reserve Funds: Sterling	... ...	£4,500,000
Silver	... ...	$23,500,000
Reserve Liability of Proprietors	... ...	$20,000,000

Court of Directors:

G. M. DODWELL, Esq., Chairman

Hon. Mr. A. O. LANG, Deputy Chairman

D. G. M. BERNARD, Esq.
G. T. M. EDKINS, Esq.
P. H. HOLYOAK, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
A. M. BOWES SMITH, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY, BANGKOK, BATAVIA, BOMBAY, CALCUTTA, CANTON, CHEFOO, COLOMBO, DAIREN, FOOCHOW, HAIPHONG, HAMBURG, HANKOW, HARBIN, ILOILO, IPOH, JOHORE, KOBE, KUALA LUMPUR, LONDON, LYONS, MALACCA, MANILA, NAGASAKI, NEW YORK, PEKING, PENANG, RANGOON, SAIGON, S. FRANCISCO, SHANGHAI, SINGAPORE, SOURABAYA, SUNGEI PATANI, TIENTSIN, TSINGTAO, VLADIVOSTOCK, YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

SOUTH AMERICA

HEAD OFFICE: MONTREAL, CANADA

We offer a complete banking service in the following countries, special attention being given to the handling of collections.

ARGENTINE — Buenos Aires (2 Branches).
BRAZIL — Rio de Janeiro, Santos, Sao Paulo.
URUGUAY — Montevideo.
VENEZUELA — Caracas, Ciudad Bolivar. Maracaibo.
COLOMBIA — Barranquilla.
BR. GUIANA — Georgetown, Rose Hall, New Amsterdam.

Also 90 Branches in
CUBA, PORTO RICO, DOMINICAN REPUBLIC, HAITI, COSTA RICA, BR. HONDURAS, BRITISH WEST INDIES and FRENCH WEST INDIES

614 Branches throughout CANADA & NEWFOUNDLAND

LONDON — Princes St., E.C.
PARIS — 28, Rue du Quatre-Septembre.
NEW YORK — 68, William St.
BARCELONA — Plaza de Cataluna 6.

THE ROYAL BANK OF CANADA

CAPITAL PAID UP & RESERVES $41,000,000 GOLD
TOTAL RESOURCES - - $500,000,000 GOLD

UBEL
SEMI-ROTARY PUMPS

Standardization of parts is a feature of these pumps, guaranteeing interchangeability when necessary. This combined with the looked-for accuracy and finish of the UBEL product, account for the fact that they enjoy an ever increasing popularity and wide-spread demand

Double and Quadruple Acting Semi-Rotary Pumps for Domestic and Trade purposes of every description. Contractors' Pumps, Ships' Pumps, Rotary Suds Pumps for Machine Tools, Plumbers' Force Pumps, Boiler Test Pumps, etc.

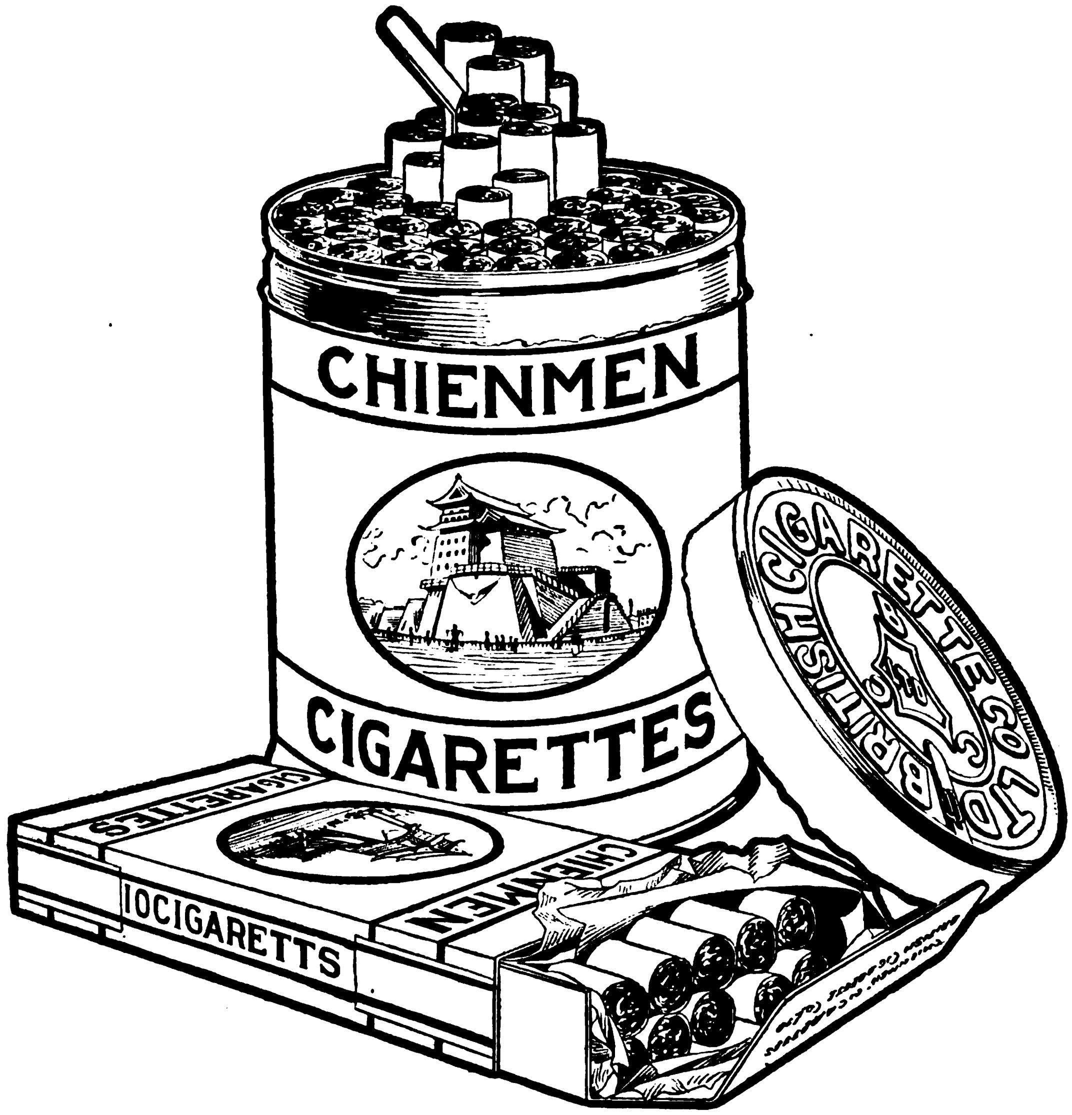
Write for Catalogue Section P. covering whole range of UBEL Semi-Rotary and general hand pumps.
Free on application.

United Brassfounders and Engineers Limited
FIVE WORKS — UBEL — 3000 WORKERS
HEAD OFFICE EMPRESS FOUNDRY — CORNBROOK MANCHESTER ENGLAND

Ubel Representative:
ANGLO-CHINESE ENGINEERS ASSOCIATION, LTD.,
83 Chao Yung Ken, Peking

CHIENMEN

Cigarettes



A brand well known to the "High Grade Cigarette Smoking Public" of China.

BRITISH-AMERICAN TOBACCO CO. (CHINA), LTD.

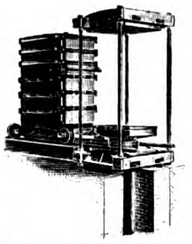
Distributors

Tel. Address: "OMO" | Codes: A.B.C. 4th & 5th Edition | Established 1810

To Exporters and Manufacturers

who require

Hydraulic Presses



Hydraulic Packing Press, for Cotton Waste, etc.

for packing goods of every description, for Home and Foreign transport.

May we have your enquiries?

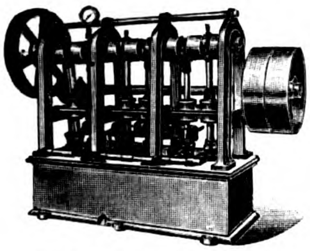
We make Presses and Pumps for Hand, Steam, and Electric Power.

EDWIN MILLS & SON LTD.

Wakefield Road,

Aspley,

HUDDERSFIELD.



6 Throw Belt Driver Pump

Hydraulic Leathers, Pipes and Fittings always in stock.

DIAMOND

SOOT BLOWERS

For all types of high - pressure Steam Boilers

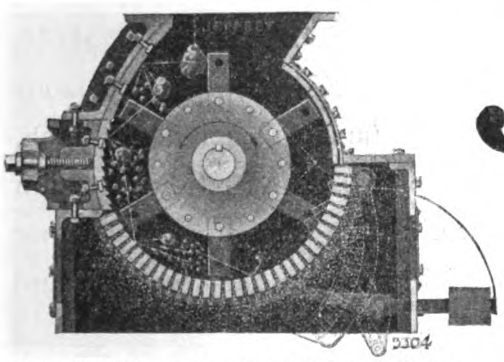
MANUFACTURED BY

DIAMOND POWER SPECIALTY CORPORATION

(SUCCESSORS to DIAMOND POWER SPECIALTY CO.)

10340 Oakland Ave.,
Detroit, Michigan,
U. S. A.

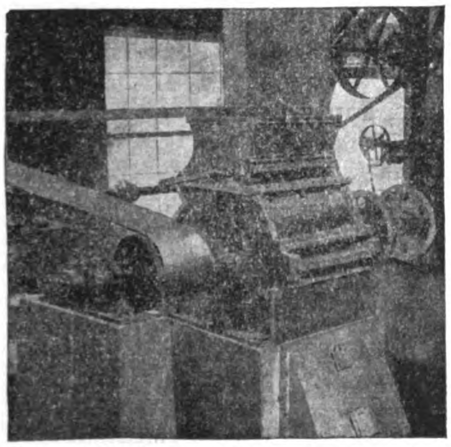
JEFFREY SWING HAMMER PULVERIZERS



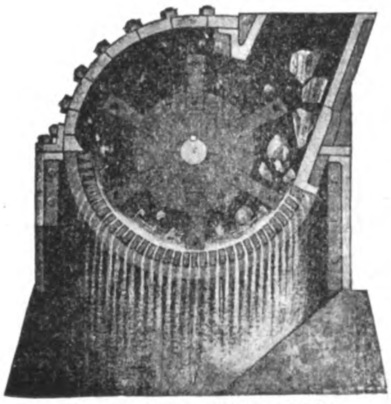
Type "B" Pulverizer—a fine grinding machine for hard service.

Grind all kinds of Friable Materials to the Proper Degree of Fineness with Minimum Power Consumption.

Built in various types and sizes with wide range of capacities and products.



Type "B" Pulverizer grinding Limestone in a cement plant.



Sectional View of Type "A" Pulverizer.

Let our expert Engineers cooperate with you and submit recommendations and quotations on our standard equipments, to suit your individual requirements.

The Jeffrey Mfg. Co.

Columbus, Ohio, U. S. A.

SOUTH MANCHURIA RAILWAY

MANCHURIA AND CHOSEN LINES

Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul and Dairen and Changchun), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least twice a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

SOUTH MANCHURIA RAILWAY COMPANY

Head Office: DAIREN

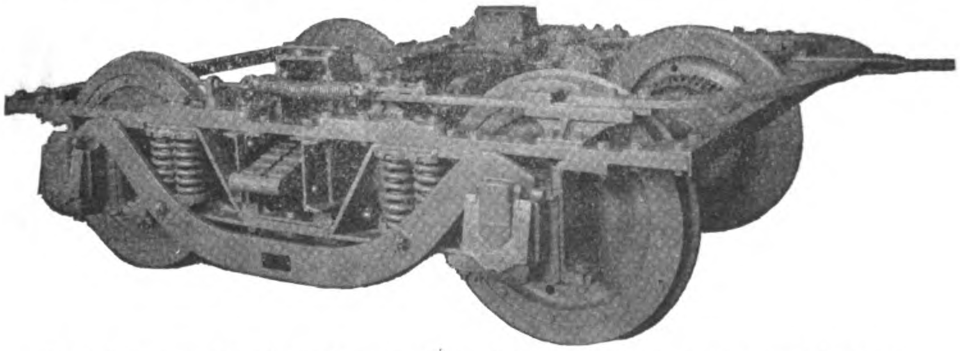
Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

Telegraphic Address: MANTETSU or SMRCO. Codes: A.B.C. 5th & 6th Editions, A1 Lieber's, and Bentley's

BALDWIN

Improved Motor Trucks

meet the most severe conditions of high-speed electric interurban and street railway service



Baldwin Type A Truck used on the Osaka Electric Railway, and also on the Osaka Tetsudo Railway. Similar trucks are also used on American and foreign railways.

Baldwin Electric Motor trucks are designed and built with the same engineering skill and excellence of workmanship as our locomotives.

Among the notable features which have made these trucks most desirable in various parts of the world may be mentioned the following:—

- Weight consistent with strength.
- Accurately built—lowest possible rolling resistance.
- Minimum current consumption.
- High efficiency in service.
- Easy to inspect and repair.
- Perfect riding qualities.
- No unnecessary tilting or rocking.
- Axles of unusual strength.
- Self-lubricating, dust-proof Journal boxes.
- Simplest and best brake design.
- Highest quality materials.
- Built for centre pin loads from 20,000 to 60,000 pounds.
- May be designed for any gauge track.

For Simplicity, Strength and Perfect Riding Qualities, Baldwin Trucks Cannot be Excelled

Detailed information upon request

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U.S.A. **Cable Address: "Baldwin, Philadelphia"**

SALE & FRAZAR, LTD., Tokyo and New York
J. O. FEENSTRA, Bandoeng, Java, D. E. I.
C. BREWER & CO., LTD., Honolulu, Hawaii
NEWELL & CO., Melbourne, Victoria
ANDERSEN, MEYER & CO., LTD., Shanghai and New York
PHILLIPS & PIKE, Wellington, New Zealand
R. TOWNS & CO., Sydney, New South Wales
LESLIE & CO., Perth, Western Australia
PACIFIC COMMERCIAL CO., Manila, P. I., and New York
J. W. KELER, Harbin, Manchuria

705

MOTOR TRUCKS

JAPANESE
GOVERNMENT
RAILWAYS

THOROUGHLY EQUIPPED LINES REACH EVERY PLEASURE RESORT AND BUSINESS POINT

Reserved Cars, Private Cars, Special Trains on Previous Arrangement for Tourists' Parties of all Sizes

WELL-FURNISHED PASSENGER CARS WITH SLEEPING AND DINING ACCOMMODATION ON THROUGH TRAINS AND EXPRESSES

TWO MOST RELIABLE ORGANIZATIONS FOR TRAVELLERS

1. JAPAN TOURIST BUREAU
   Peking Office: Morrison Road, Peking
   Head Office: Tokyo Station, Tokyo, Japan
2. JAPAN HOTEL ASSOCIATION
   c/o Traffic Bureau, Japanese Government Railways

For Particulars, Time-Tables, Guide Books, etc., please apply to
TRAFFIC BUREAU, DEPARTMENT OF RAILWAYS, TOKYO, JAPAN

JAPANESE
GOVERNMENT
RAILWAYS

THROUGH BOOKING TO AND FROM

CHINA

Single and Return Tickets between China and Japan via Chosen

Period of Validity: Single, 40 days: Return, 110 days. 20% Reduction for Return Tickets

China-Japan Party Trip Tickets

Period of Validity: Two months. Reduction: 25%-50% for 10 or more passengers

China-Japan Circular Tour Tickets

Period of Validity: Four months. Reduction: 30% for Railway; 25% for Steamer

China-Japan Parcel Through Traffic

Parcel through conveyance between the principal stations in China and Japan viâ Chosen at low rates

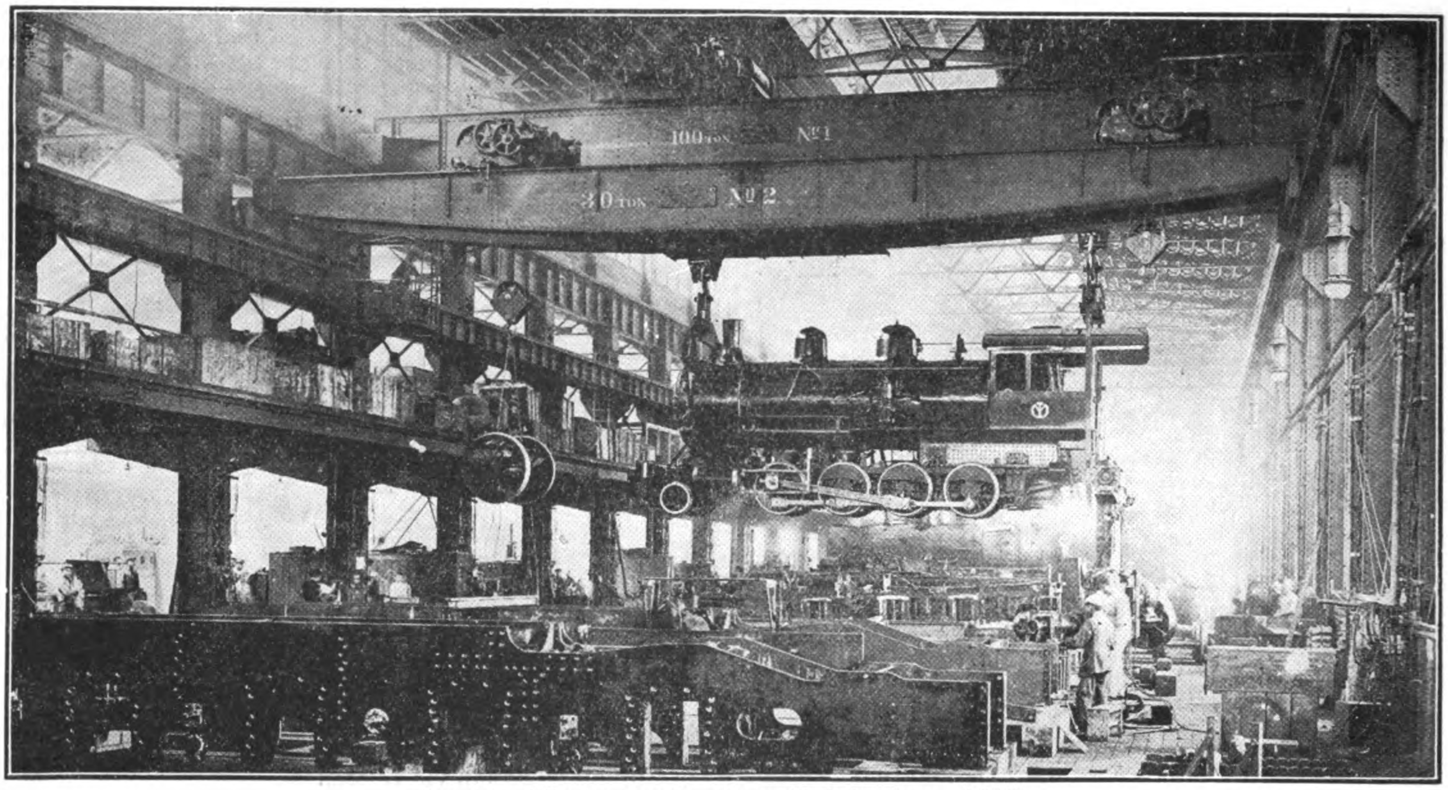
OFFICIAL GUIDE TO EASTERN ASIA

1st	Vol. Manchuria and Chosen	Y. 7.00	Sold at	Kelly & Walsh (Yokohama, Shanghai)
2nd	,, S.W. Japan	Y. 5.00	,,	Maruzen (Tokyo)
3rd	,, N.E. Japan	Y. 5.00	,,	Offices of Japan Tourist Bureau (Tokyo, Kobe, Peking, etc., etc.)
4th	,, China (Proper)	Y. 7.00		
5th	,, East Indies	Y. 5.00	,,	G. P. Putnam's Sons Co. (New York)
			,,	The Philippine Educational Co. (Manila)

SOUTH MANCHURIA RAILWAY

RAILWAY

SHAKAKO WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

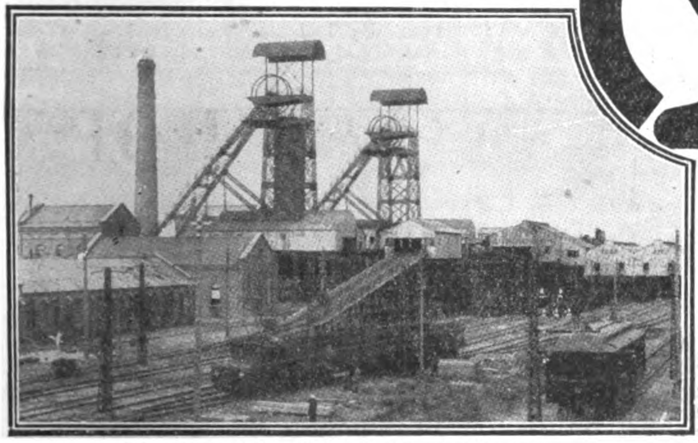
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

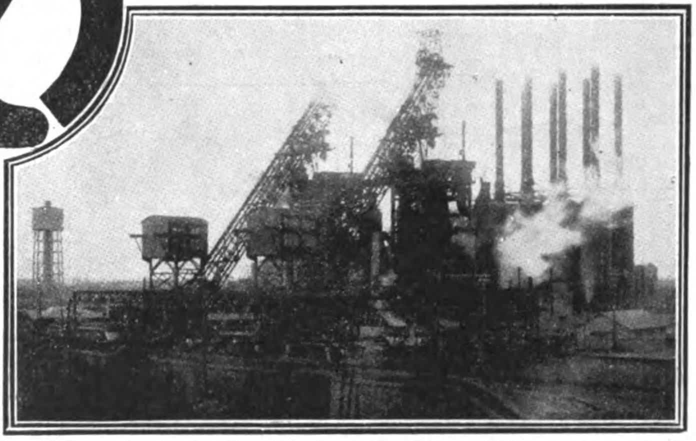
THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON



Togo Pit of the S.M.R. Fushun Collieries



Anshan Steel Works of the S.M.R.

FUSHUN COAL

The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

Depots:

Dairen (Yingkou), Port Arthur, Tientsin, Newchwang, Tsingtao

Agencies:

Chefoo, Manila, Hongkong, Sourabaya, Singapore, Penang, Takao (Formosa), Batavia, Yokohama, South Seas, Niigata, Osaka, Nagoya, Shanghai, Moji, Saigon, etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day) Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day) Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

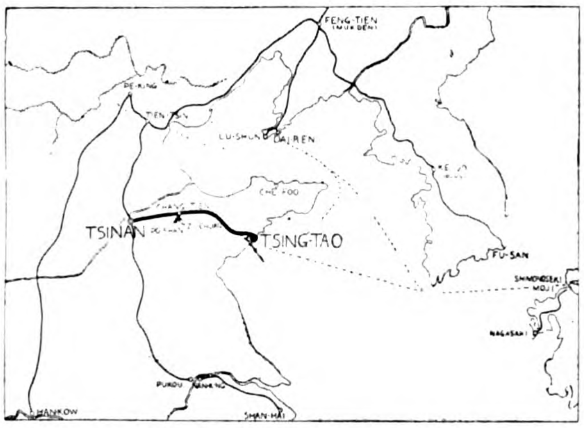
A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

BUT THE TWAIN HAS MET AND BLENDED HERE

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.

For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.

Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway. At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.

The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1	leaves Tsingtao	daily	10.00 p.m.	arrives Tsinan	8.00 a.m.
Train No. 3	leaves Tsingtao	daily	8.00 a.m.	arrives Tsinan	6.40 p.m.
Train No. 2	leaves Tsinan	daily	11.00 p.m.	arrives Tsingtao	8.35 a.m.
Train No. 4	leaves Tsinan	daily	10.10 a.m.	arrives Tsingtao	8.20 p.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30 ; 2nd class, $7.20.

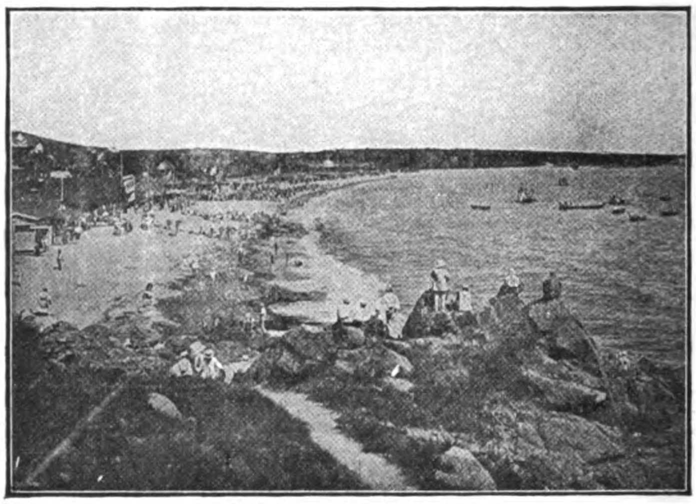
First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.



BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

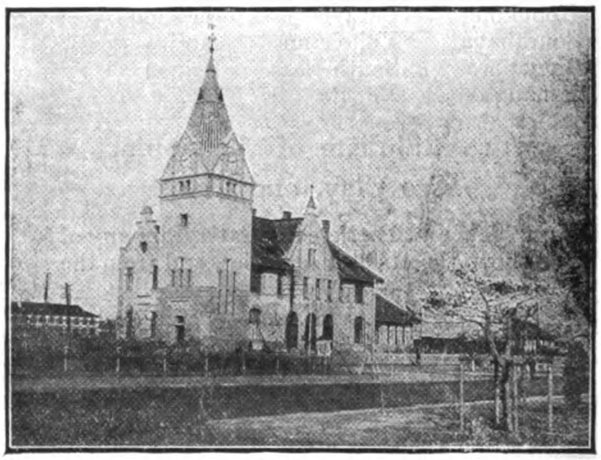
The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.



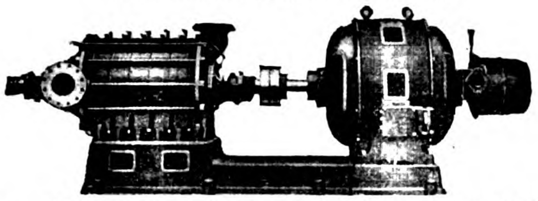
TSINGTAU STATION

For Further Information, please apply to

THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

"BON ACCORD" TURBINE PUMPS
For Mine Sinking, and Pumping



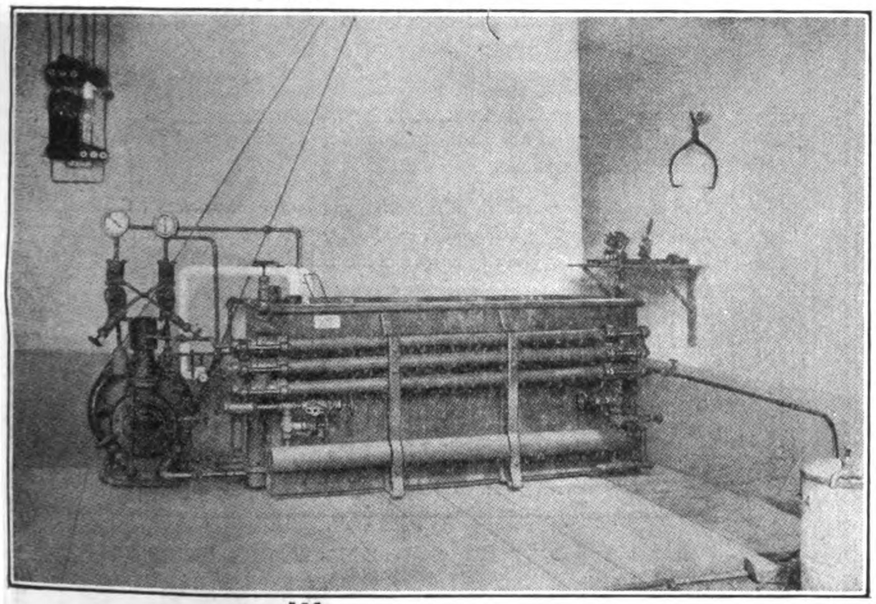
6-Stage "Ring" Type Turbine Pump, Driven by A. C. Motor for Mine Purpose, 600 Galls. per min., 200 feet head.
DRYSDALE & Co., Ltd., Yoker, Glasgow
Tel. Address: Bonaccord, Glasgow

TO REACH THE INDUSTRIAL BUYERS OF THE ORIENT
ADVERTISE
IN THE
FAR EASTERN REVIEW

"USE IS THE TEST"
MANUFACTURERS of High Grade TELEPHONE APPARATUS
Plans and Specifications furnished for Complete Telephone SYSTEMS.
Village, City and Long Distance Service

Code No. 5020
Magneto Telephone
KELLOGG SWITCHBOARD & SUPPLY CO.
Head Office & Factory, Chicago, U.S.A.
Tel. Add. "SWITCHBOARD"
Far Eastern Branch
No. 62 Kiangse Rd.
SHANGHAI.

Long-Lived Ice Plants



In order that ice-making machines shall give continuous satisfactory service in tropical countries, they must be rugged, simply but carefully constructed and possess the minimum number of moving parts.

BRUNSWICK
EGUIPMENT

fulfills all these conditions. The result is that everywhere reports come in concerning their satisfactory service, long life and low upkeep.

The illustration shows the *Brunswick* plant of Emerito G. Leyva, Calle de S. Antonio No. 221 Cordoba, Ver., Mexico. Shipped July 1914, there neve has been need of renewal of part or of essential repair. As can be seen from the photograph, the machine is still in good condition and is working efficiently.

Of another Mexican machine, shipped in 1906, the owner lately writes: "This machine has been working very regularly. All the parts are in perfect condition, the eccentric wedge, alone, having been renewed."

If interested, we shall be glad to tell you of other notable records of *Brunswick* plants and describe the machine we make especially suited to your requirements.

BRUNSWICK REFRIGERATING CO.
Dept. 2, New Brunswick, N. J., U.S.A.

We call especial attention to our combined ice-making and refrigerating plant. It is small, portable and is constructed to produce twenty pounds of ice each day and to keep the adjoining compartments always cool. Complete instructions with each plant. Further details, upon request.

Chicago Tribune of June 12, 1921, says: "*The Asiatic Review* is the best informed Far East periodical."

THE

ASIATIC REVIEW

Formerly the *Asiatic Quarterly Review*

FOUNDED 1886

Per Copy....... ....(5/-) (Post free)
Annual Subscription.....(£1) (Post free)

Agents in the Far East:
MARUZEN & CO., Tokyo, Japan
KELLY & WALSH, LTD. (all branches)

PUBLISHED QUARTERLY

BY

EAST AND WEST LIMITED

3 VICTORIA STREET, LONDON, S.W.

Chief Features:—

Leading articles on Asiatic Affairs by specialists

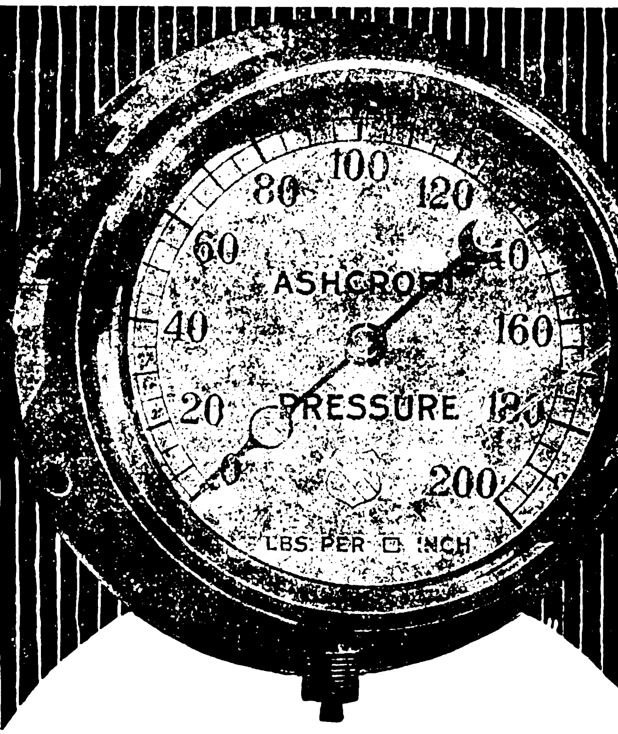
Articles on Oriental Art, Archæology and Religion

Proceedings of the "East India Association"

Summaries of Lectures and papers of other Leading Asiatic Societies in London

Literary Supplement: Books on Asia, Orientalia, General Literature and Fiction, Review of Current Periodicals

Commercial Section Financial Section
Educational Section



Ashcroft Gauges
Are Instruments of Precision

ALL types for indicating pressure, vacuum or compound, are made in a complete range of sizes and styles to meet every requirement of the most critical engineers. They are instruments of precision, embodying the best possible materials and workmanship.

Made with either drawn brass or pressed steel case and ring. The steel case is stronger than the brass and has a black hard rubber finish which will not chip off and which retains its fine appearance indefinitely. Made in 2½", 3½", 4½", 5" and 6" sizes—styles and connections are British or Metric standard.

Ashcroft Drawn Case Gauges represent the best ideas in gauge construction, and are built to combine accuracy and durability with fine appearance.

Our agent is prepared to advise with you and quote prices. Consult him also regarding Consolidated Safety Valves and Metropolitan Injectors, used for years by engineers the world over.

Manning, Maxwell & Moore, Inc.

New York

Henry Katten, 22 Kiukiang Road, Shanghai, China

ASHCROFT GAUGES

THE

North-China Daily News

Established in 1850 as a weekly; in 1870 as a daily

To the Reader

The "North-China Daily News" writes the history of China. It records the pulse of its politics; it reports the conditions of its finance and its markets; and it chronicles the daily doings of its people.

To the Advertiser

The greatest purchasing power in China is that possessed by readers of the "North-China Daily News." It is the newspaper which is found in every office, consular or commercial; it is the newspaper most frequently quoted both by the foreign and vernacular press; and it is the one newspaper which combines a quality with a quantity circulation—being the largest both in size and circulation in China. It was the first newspaper to publish audited circulation statements.

Subscription: Mex. $28 per annum.

(Postage Extra).

The North-China Herald

Is the weekly edition of the "North-China Daily News" for readers abroad. It contains 95 per cent. of news and is the best medium for keeping in touch with events in China when out of reach of the daily.

Subscription: Mex. $16 per annum.

(Postage Extra).

Copies of either of the above publications will be sent to anyone interested on request.

NORTH-CHINA DAILY NEWS & HERALD, LTD.,
Shanghai.

Telegraphic Address: "Herald Shanghai."—All Codes.

A NORTH-CHINA TRADE DIRECTORY

The North China Desk Hong List

Is the only Trade Directory of North China issued twice a year. Its information is the most accurate and complete. Published regularly since 1865 it has grown to 900 pages. In addition to the names and addresses of every foreign firm, resident, and missionary in China it contains the following classified information:—

SHANGHAI HONG LIST.—All firms, institutions, missions, consulates, etc., in Shanghai, with staffs, arranged alphabetically.

TRADE DIRECTORY.—A list of all Shanghai firms under their professional or trade headings.

AGENCIES.—Agencies held by Shanghai firms are listed alphabetically, with the firm's name after them.

STREET DIRECTORY.—A list of the streets of Shanghai in English and Chinese, with the occupants of all foreign and many Chinese houses, offices, and stores.

SHANGHAI WHO'S WHO.—An alphabetical list of the men of Shanghai, with their business addresses.

RAILWAYS.—A list of the Northern Railways of China, with their foreign and native staffs, including those resident in Shanghai.

RESIDENTIAL DIRECTORY.—A complete list of the foreign residents of Shanghai, arranged alphabetically, with their private addresses.

OUTPORT HONG LIST.—A list of Northern and Central China cities and outports with foreign firms and institutions and their staffs.

OUTPORT WHO'S WHO.—An alphabetical list of foreign men in Northern and Central China, compiled from the Outport and Railway Sections of this work.

OUTPORT LADIES' LIST.—An alphabetical list of foreign ladies, not engaged in mission work, resident in Northern and Central China.

OUTPORT MISSIONARIES.—Classified alphabetically by provinces. Under the names of the provinces are given the towns where missions are established, with list of residents. This is divided into two sections: (1) Protestants, (2) Roman Catholics. Mission Institutions, such as Schools, Colleges, etc., will be found under the respective Ports in which they are instituted.

MISSIONS WHO'S WHO.—An alphabetical list o missionaries of each denomination, compiled from the previous section.

GENERAL.—Consular, postal, exchange and other information.

PRICES:

Shanghai **$8** with map **$6** without map

On Sale at the Offices of

The North-China Daily News

(Temporary offices during rebuilding)

2B Kiukiang Road, Shanghai

PUBLISHED ANNUALLY

THE LONDON DIRECTORY

with Provincial & Foreign Sections,

enables traders to communicate direct with

MANUFACTURERS & DEALERS

in London and in the Provincial Towns and Industrial Centres of the United Kingdom and the Continent of Europe. The names, addresses and other details are classified under more than 2,000 trade headings, including

EXPORT MERCHANTS

with detailed particulars of the Goods shipped and the Colonial and Foreign Market supplied ;

STEAMSHIP LINES

arranged under the Ports to which they sail, and indicating the approximate Sailings.

One-inch BUSINESS CARDS of Firms desiring to extend their connections or Trade Cards, of

DEALERS SEEKING AGENCIES

can be printed at a cost of £1.10.0 for each trade heading under which they are inserted. Larger advertisements from £2 to £16.

A copy of the directory will be sent by parcel post for £2, nett cash with order.

THE LONDON DIRECTORY CO., LTD.

25 Abchurch Lane, London, E.C. 4, England

BUSINESS ESTABLISHED IN 1814

AWARDED GRAND PRIZE OF HONOUR
PANAMA PACIFIC EXHIBITION, SAN FRANCISCO, 1915.
MOST POPULAR **BEER** IN THE ORIENT

ASAHI YEBISU SAPPORO

BREWED BY

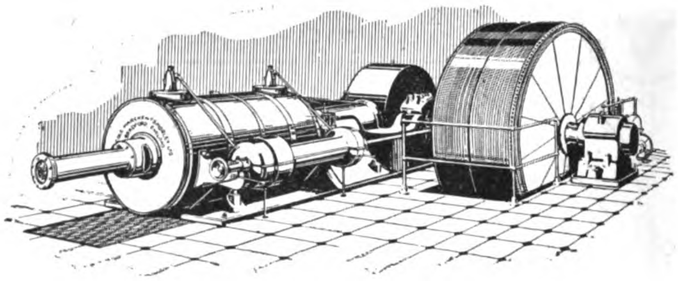
THE DAI NIPPON BREWERY CO., LTD.

HEAD OFFICE: TOKYO

BRANCHES OSAKA, SAPPORO, SEOUL, SHANGHAI, TSINGTAO.

SOLD EVERYWHERE

Agents: MITSUI BUSSAN KAISHA,
China, Straits Settlements, Dutch East Indies, and British India



C. M. & M.
CENTRAL EXHAUST STEAM ENGINE

100 to 3,000 I.H.P.

The ideal Prime Mover for driving Mills and Plant where moderate power from 100 to 3,000 I.H.P. is required

PRINCIPAL FEATURES

ECONOMY: The steam consumption equals that of a good Triple Expansion Engine.

SIMPLICITY: This type of engine is undoubtedly the simplest economical engine of the present day.

UPKEEP COSTS: Owing to the low steam consumption, simplicity and to the fact that forced lubrication is fitted, upkeep costs and attendance are reduced to the minimum.

FLOOR SPACE OCCUPIED: Is considerably less than that required by Horizontal Compound Engines.

The above illustration is of a 1,500 I.H.P. C. M. & M. Central Exhaust Steam Engine recently shipped to Hankow, China.

Write to-day for Catalogues Nos. 63 & 69, which will be sent post free on request.

ESTA. 1848

REGd TRADE MARK

Cole, Marchant & Morley, Ltd.

Bradford, England

Cables: "Cole Bradford"

Electrical Plant for all purposes

We are manufacturers of every kind of Electrical Apparatus from large Turbo-Alternator Sets to simple Bell Pushes. We manufacture the whole of the apparatus necessary for the generation, transmission and utilisation of Electrical Energy.

Steam Turbines, Condensers, Alternators, Transformers and High Tension Switchgear, Rotary Converters, Low Tension Switchgear, Control Apparatus and Large and Small Motors suitable for all Industrial and Traction purposes.

Lamps, Lamp Fittings, Accessories, Heating and Cooking Appliances and Bell Pushes.

Send your enquiries to our representatives in your district:

METROPOLITAN Vickers

ELECTRICAL CO., LTD.
MANCHESTER ENAGLND

Sole Distributors for China

Messrs. Arnhold Bros. & Company, Limited.

SHANGHAI

Tientsin, Hankow, Peking, Changsha, Newchwang, Chungking, Mukden, Ichang, Harbin, Shansi, Hongkong, Canton

Electric Cooking "HIGHLOW" Apparatus

No. 50. IRON. Loading 500 Watts. Weight 6lbs.

Thumb rest.
Strong Tip-up Stand.
Best Nickel-plated finish.

ELECTRIC COOKER. Total Loading 4 kw.

No. 60. ELECTRIC KETTLE. 750 Watts.
Polished Copper or Nickel-plated, 2 pints Capacity.

Elements are wound on clear ruby mica with nickel contacts taken direct to the terminals.

Heating and Cooking Apparatus for Domestic, Ship's and Restaurant use.

Catalogue on request to the Sole Makers:

Archibald Low & Sons, Ltd.

Merkland Works, Partick, Glasgow, Scotland

Telegrams: "Highlow, Glasgow"

Code: A.B.C.

SHANGHAI TO SEATTLE 16 DAYS

A New Fast American
TRANS-PACIFIC SERVICE
between MANILA-HONGKONG
SHANGHAI
KOBE-YOKOHAMA
and PUGET SOUND
VICTORIA, B.C.—SEATTLE, WASH.
VIA THE SHORT ROUTE

UNITED STATES SHIPPING BOARD 535's

		Leaving Shanghai		Arr. Seattle	
President McKinley	(X Keystone State)	July	16	Aug.	1
,, Jackson	(X Silver State)	July	30	Aug.	15
,, Grant	(X Pine Tree State)	Aug.	13	Aug.	29
,, Jefferson	(X Wenatchee)	Aug.	27	Sept.	12
,, Madison	(X Bay State)	Sept.	10	Sept.	26

AGENTS

Manila: No. 24 Calle David, P.O. Box 1636
Hongkong: No. 2 Ice House Street.
Shanghai: No. 29-B Nanking Road, Amer. P.O. Box 503
Kobe: No. 7-A Kaigan-Dori. P.O.Box 308
Yokohama: No. 75-A Main Street, P.O. Box 326
Singapore: No. 2 Prince Street.

HEADQUARTERS FOR THE FAR EAST,
No. 29-B Nanking Road, Shanghai.
Major GEO. A. HEYBURN, Acting Manager
GEO. J. McCARTHY, Assistant General Passenger Agent.

THE ADMIRAL LINE P.S.S.CO.

The ADMIRAL LINE

ANYWHERE ON THE PACIFIC
PACIFIC STEAMSHIP COMPANY

The "PEAK" Pinion

"THE" NOISELESS GEAR FOR HOT CLIMATES

The "PEAK" PINION is pre-eminent among Noiseless Pinions by reason of the following features:—

1.—It is stronger than any other "noiseless" Pinion made.
2.—It is light in weight (not needing to be reinforced by metal plates).
3.—It is impervious to water, oil, acid and alkali.
4.—It is unaffected by heat.
5.—It can be stored for any length of time without distortion.
6.—It is vermin proof.

"PEAK" Pinions can be used wherever metal gears are employed. By their use the nerve-racking clatter of metal-to-metal gears is done away with. They are smooth-running, and have no "ring." On high-speed electric motors, for positive drives, they are essential, and by their cushioning effect not only save the companion-wheels but prevent vibration and consequent damage to both motor and machine. The Pinions are turned, bored, key-wayed, and teeth accurately machine-cut, and finished complete ready for fitting to shaft.

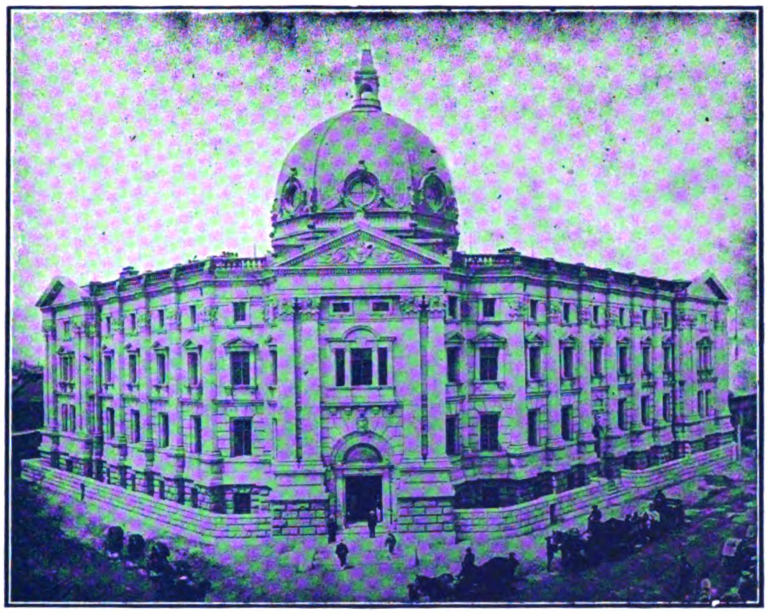
SOLE MAKERS:

THE REAY GEARWORKS, LTD.

(Manufacturers of all classes of Toothed Gearing),
GATESHEAD-ON-TYNE, ENGLAND

Capital (Fully Paid-Up):
Yen 100,000,000

Reserve Fund:
Yen 61,000,000



HEAD OFFICE, YOKOHAMA

CORRESPONDENTS AT ALL THE CHIEF COMMERCIAL CITIES IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: KENJI KODAMA, Esq.
Vice-President: REITARO ICHINOMIYA, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASUNOSUKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
NAKAJI KAJIWARA, Esq.
SHIMAKICHI SUZUKI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
BARON KAISAKU MORIMURA
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.
HIROZO MORI, Esq.
KUNIZO MOGAMI, Esq.

Head Office: YOKOHAMA
Manager: N. IGARASHI, Esq.

TOKYO BRANCH
No. 1, Itchome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES.

Batavia
Bombay
Buenos Aires
Calcutta
Changchun
Dairen
Fengtien
Hamburg
Hankow
Harbin
Hongkong
Honolulu
Kaiyuang
Kobe
London
Los Angeles (sub-office of San Francisco Branch)
Lyons
Manila
Nagasaki
Nagoya
Newchwang
New York
Osaka
Peking
Rangoon
Rio de Janeiro
Saigon
San Francisco
Seattle
Shanghai
Shimonoseki
Singapore
Sydney
Sourabaya
Tientsin
Tsingtau
Tsinan
Vladivostock

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.

大正七年七月十日第三種郵便物認可

Printed by the North-China Daily News and Herald, Ltd., for the Proprietors.

大正七年七月十日第三種郵便物認可

THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

上海仁記路第五號

遠東時報

SUMITOMO

KOBE HARBOR

ELECTRICAL DEVELOPMENTS IN JAPAN

SUGAR INDUSTRY IN CHINA

CHINESE KAOLIN

ENGINEERING NOTES—KOREA

F. M. S. MINING NOTES

SIAMESE STATE RAILWAYS

Vol. XVIII AUGUST, 1922 No. 8

SHANGHAI, PEKING, TOKYO AND MANILA

A. L. TAYLER

FURTHER BIG REDUCTIONS

DENNIS

COMMERCIAL MOTORS

Practically back to Pre-War Prices

Type	To-day's Price	Price Jan., 1921	Reduction
2-2½-ton Standard Lorry Chassis...	**£730**	£ 997	***£267***
2-2½-ton Long Char-a-bane Chassis	**£750**	£1,007	***£257***
3½-4-ton Lorry Chassis	**£865**	£1,195	***£330***
3½-4-ton Char-a-bane Chassis ...	**£880**	£1,190	***£310***
4-ton Long Wheelbase Omnibus Chassis	**£950**	£1,200	***£350***
5-6-ton Lorry Chassis	**£960**	£1,320	***£370***

The prices given above are F.O.B. Guildford, England

WITH a view to stimulating trade and maintaining employment, we have written down our Stocks to a figure very much under cost, and this, with the wages reductions that will take place in the near future, has enabled us to sell our Chassis as from October 1st at the prices mentioned opposite.

Purchasers of "DENNIS" vehicles, even at such low prices, can feel perfectly assured that they are acquiring absolutely new goods of latest and most improved construction, as Dennis Brothers have never purchased or taken back second-hand War Lorries. The Vehicles we are offering are absolutely new and embody improvements on previous models. We have been able to keep our factory busy on new productions, and are not selling Chassis made two to six years ago and re-purchased from the Government, nor are we offering re-conditioned War Chassis.

WRITE FOR PARTICULARS:—

Agents:

Messrs. Wearne Brothers, Ltd., 310 Orchard Road, Singapore.
Messrs. Perrin Cooper & Co., Consular Road, Tientsin.
Messrs. Central Garage Co., 9 Hongkong Road, Shanghai.
Messrs. Alex Ross & Co., Ltd., Machinery Department, Hongkong.
Messrs. Fikkert Motor Car Co., Weltevreden, Batavia.

Cables: A.B.C. 5th Edition, Lieber's, Bentley's, Marconi.

DENNIS BROS., LTD.

GUILDFORD, ENGLAND

D 221

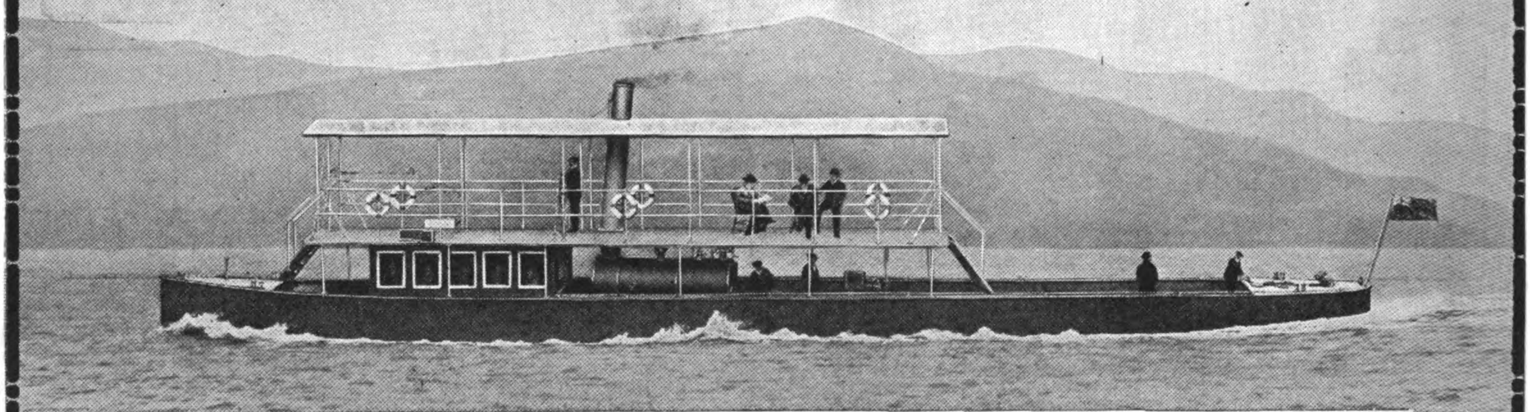
SHALLOW DRAUGHT LAUNCH—YARROW SYSTEM,

built by

YARROW & CO., LTD., Glasgow,

(formerly of Poplar, London).

Yarrows, Limited, of Victoria, British Columbia, Shipbuilders, Ship Repairers and Engineers, are associated with Yarrow & Co., Ltd., Glasgow.



Length, 160-ft.; Beam, 24-ft. 6-in.; Draft, carrying 40 tons 2-ft. 3-in.; Speed, carrying 40 tons 15 Statute miles an hour, burning wood fuel only

Vessel as above illustrated can be shipped whole to any part of the world.

Messrs. YARROW Construct Fast Passenger and Commercial Vessels, Shallow Draught Steamers, Tugs, etc., propelled by Sternwheels, Side Wheels, or Screws working in Tunnels fitted with Yarrow's Patent Balanced Hinge Flap.

RIELLEY, SIMMONS & MILNE, Agents, Shanghai.

FOUNDED, 1904

The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.

HEAD OFFICE: 5 JINKEE ROAD - - - - SHANGHAI, CHINA.

George Bronson Rea, *Editor and Publisher* William Carter Rea, *Advertising Manager*

JAPAN OFFICE: H. C. Huggins, Representative, No. 12 Takagi-cho, Akasaka-ku, Tokyo.

NEW YORK: British and Colonial Press, Inc., 738 The Knickerbocker Building, Broadway and 42nd Street.

MANILA OFFICE: Fleming, Percy Smith and Seth, Roxas Building, Escolta.

CHICAGO: British and Colonial Press, Inc., 140 Dearborn St.

GREAT BRITAIN: Walter Judd, Ltd., 81-87 Gresham Street Bank, London, E.C.

SAN FRANCISCO: Leroy P. Boyce, Monadnock Building

SUBSCRIPTION IN CHINA: $10.00 Mexican, U. S. & Philippines Gold $5.00, Elsewhere $12.00 Mexican per annum

VOL. XVIII AUGUST, 1922 NO. 8

CONTENTS:

	PAGE
SUMITOMO	*463
Yangtze Commission	471
PORT OF KOBE IMPROVEMENTS	*472
Cut in Japan's Railway Estimates	480
THE FUJI-MINOBU RAILWAY CO.	*481
PRIVATE RAILWAYS IN JAPAN	483
Electric Machinery Makers Combine	483
PAPER MAKING IN JAPAN	*484
Osaka Public Works for 1923	487
ELECTRICAL DEVELOPMENTS IN JAPAN	*488
JAPANESE ENGINEERING NOTES	496
EDITORIALS:	
Kato	*500
The Vindication of Lobinger	501
Educate Chinese in China	501
The "Amende Honorable"	502
Hands Across the Pacific	503
Crisp and the Consortium	503
Trimming the Salt Gabelle	503
Gee! What a Wad!	504
Sun Yat-sen	505
The Effect of Civil War on China's Railways	505
The Diplomatic Status of Famine Relief	506
Opportunity for Mining Engineers in China	509
INTERNATIONAL GOOD-FELLOWSHIP AT TSINGTAO	*510
CHINESE KAOLIN FOR AMERICAN POTTERIES	*511
America's Best Opportunity	*514
ENGINEERING NOTES FROM KOREA	*515
COAL RESOURCES OF KARAFUTO	*517
SIAMESE STATE RAILWAYS	*518
English Electric Company	*519
THE CANE SUGAR INDUSTRY OF CHINA	*520
Malayan Match Factory	523
NAVIGATIONAL INSTRUMENTS	*524
Review	524
THE NEW DIAMOND VALVE-IN-HEAD SOOT BLOWER	*525
The Asahi Petroleum Company	526
Daido Electric Transmits Power 160 Miles	526
A "BLUE FUNNEL" LAUNCHING AT HONGKONG	*527
Industrial Development of Hokkaido	527
F. M. S. MINING AND ENGINEERING NOTES	*528
THE ATAMI TUNNEL	*530
The Haiphong Cement Works	*531
Unfair Competition Forbidden by Law	532
Even the Lumber Man Protest	532

**Illustrated with Maps or Photographs*

Entered at the U.S. Postal Agency, Shanghai, China, as second-class matter. Registered at the Chinese Post Office as a Newspaper. Entered at the Japanese Post Office as a Newspaper.

ALPHABETICAL LIST OF ADVERTISERS

Admiral Line, The ... 41
Allen & Co., Ltd., Edgar ... 33
American Locomotive Sales Corp. ... 25
American Tool Works Co. ... 1
Andersen, Meyer & Co., Ltd. ... 28
Armstrong, Whitworth & Co. Ltd., Sir W. G. ... 76
Asbestos Shingle, Slate & Sheathing Co. 17
Ashton Frost & Co., Ltd. ... 19
Atlantic, Gulf & Pacific Co. of Manila 36
Attwater & Sons ... 48
Avery, Ltd., W. & T. ... 11

Babcock & Wilcox, Ltd. ... 31
Baldwin Locomotive Works ... 65
Bank of Chosen ... 52
Bank of Communications ... 57
Banque de l'Indo-Chine ... 54
Bank of Taiwan, Ltd. ... 55
Bliss Co., E. W. ... 27
Brill Co., J. G. ... 39
British-American Tobacco Company (China), Ltd. ... 62
Brunswick Refrigerating Co. ... 71
Bucyrus Company ... 9
Butterfield & Swire ... 42

Canada Carbide Co. ... 15
Chartered Bank of India, Australia & China ... 48
Chicago, Milwaukee & St. Paul Railway 15
Clough, S. W. ... 4
Cole Marchant & Morley, Ltd. ... 74
Consolidated Steel Corporation ... 14
Craig & Donald, Ltd. ... 31

Dai-Ichi Ginko ... 60
Dai Nippon Brewery Co. ... 76
Dennis Bros., Ltd. ... Cover
Diamond Power Specialty Corporation 63
Dixon Crucible Co., Joseph ... 72
Dorman Long & Co., Ltd. ... 3
Drysdale & Co., Ltd. ... 71

Electricity Department, S. M. C. ... 4
English Electric Co., Ltd. ... 8
Evans & Sons (Wolverhampton), Ld., Joseph ... 2

First National Bank of Boston ... 61
Fuji Gassed Spinning Co. ... 10

Gleniffer Motors, Ltd. ... 9
Green Island Cement Co., Ltd., The ... 20
Greenfield Tap & Die Corp. ... 11
Greening & Sons, Ltd., N. ... 4

Heap & Co., Ltd., Joshua ... 51
Hongkong Rope Manufacturing Co. ... 20
Hongkong & Shanghai Banking Corporation ... 61
Hongkong & Whampoa Dock Co., Ld. 30
Hotel Statler Co. ... 49
Humber, Ltd. ... 75

Imperial Japanese Government Railways ... 66, 67
Industrial Bank of Japan ... 56
International Banking Corporation ... 53

Japan Sugar Mfg. Co. ... 6
Jardine, Matheson & Co., Ltd. ... 12
Jones & Lamson Machine Co. ... 51
Jugo Ginko ... 54

Kanegafuchi Spinning Co., Ltd. ... 10
Kawasaki Dockyard Co., Ltd. ... 35
Kellogg Switchboard & Supply Co. ... 71
Kelvin, Bottomley & Baird, Ltd. ... 13
Kokusai Kisen Kaisha ... 43
Koster Co., The ... 39

London Directory Co., Ltd. ... 76
Low & Sons, Ltd., Archibald ... 74

Manning, Maxwell & Moore, Inc. ... 72
Mather and Platt, Ltd. ... 7
Metropolitan Vickers Electrical Co., Ltd. ... 75
McClintic-Marshall Products Co. ... 27
McConway and Torley Co. ... 21
Mills & Son Ltd., Edwin ... 63
Mitsubishi Bank ... 59
Mitsubishi Iron & Steel Co., Ltd. ... 38
Mitsubishi Marine & Fire Ins. Co., Ld. 38
Mitsubishi Shoji Kaisha ... 18
Mitsubishi Warehouse Co. ... 38
Mitsubishi Zosen Kaisha, Ltd. ... 36
Mitsui Bank ... 59
Mitsui Mining Co. ... 18
Mitsui Bussan Kaisha ... 26
Morse & Son, Inc., A. J. ... 76
Motor Rail & Tram Car Co. ... 41
Mustard & Co. ... 4

New Engineering & Shipbuilding Works ... 34
Nippon Menkwa Kabushiki Kaisha ... 50
Nippon Yusen Kaisha ... 46, 47
Nobel Industries, Ltd. ... 22

Okura & Co. (Trading), Ltd. ... 24
One Hundredth Bank, Ltd., The ... 60
Osaka Shosen Kaisha ... 44
Oster Manufacturing Co., The ... 78

Pacific Steamship Co. ... 41
Pittsburgh Steel Co. ... 71
Pittler Turret Lathe ... 78
Priestman Bros., Ltd. ... 77
Pooley & Son, Ltd., Henry ... 2

Republic Truck Sales Corp. ... 63
Royal Bank of Canada ... 61
Ruston & Hornsby, Ltd. ... 21
Ryerson & Son, Joseph T. ... 5

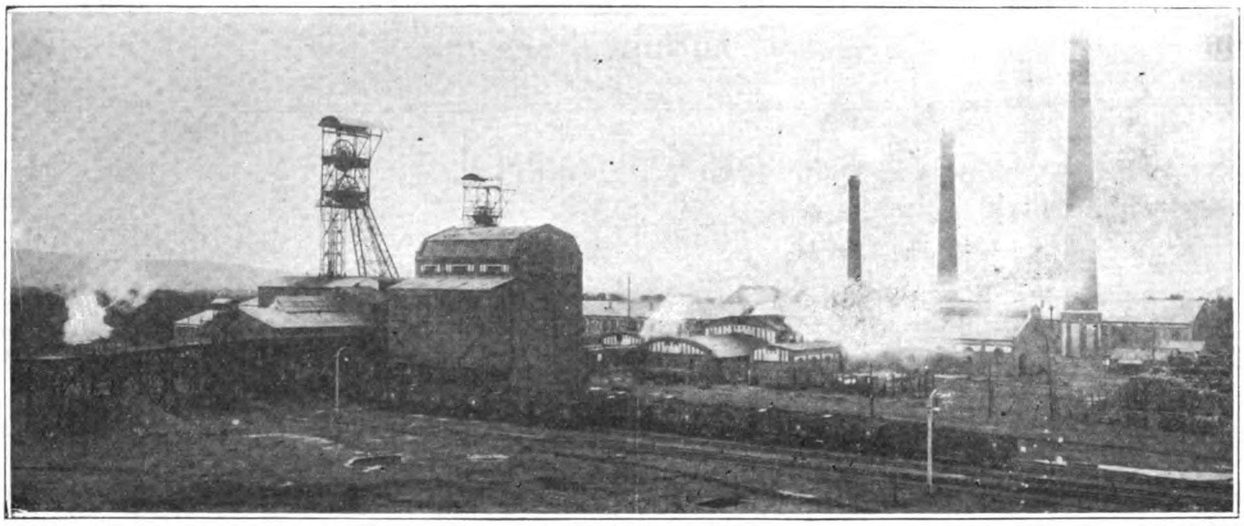
Sale & Frazar, Ltd. ... 16
Scottish Tube Co., Ltd. ... 13
Selson Engineering Co., Ltd. ... 79
Shanghai Dock & Eng. Co., Ltd. ... 32
Shanghai Municipal Council ... 4
Shantung Railways ... 70
Siebe Gorman & Co., Ltd. ... 7
Simons & Co., Ltd., Wm. ... 19
Smith Major & Stevens, Ltd. ... 15
South Manchuria Railway Co. 64, 68, 69
Standard Oil Co. of N. Y. ... 29
Sumitomo ... 58
Sumitomo Bank, Ltd. ... 58
Superheater Co., The ... 19

Thornycroft & Co., John I. ... 1
Toshin Soko ... 40
Toyo Kisen Kaisha ... 45
Transatlantische Handels-Kompagnie, m.b.h. ... 78
Trimont Manufacturing Co. ... 7

United Cigarette & Machine Co. ... 41
United States Steel Products Company ... 23, 37, Back Cover

Walworth International Co. ... 79
Whittall & Co., Ltd., J. ... 6
Wild & Co., M. B. ... 9
Williams & Co., J. H. ... 21

Yarrow & Co., Ltd. ... Cover
Yokohama Dock Co. Ltd. ... 33
Yokohama Specie Bank, Ltd. ... Cover



The Tzuchuan Colliery, Shantung

TZUCHUAN COAL

The Cheapest and Best Coal Mined in the Far East

Annual Output: 600,000 tons.
The Coal is washed, screened, and classified for the market into five grades, viz., Lump, Slack, and Washed Coal Nos. 1, 2 and 3.
Tzuchuan Coal contains a large amount of coke, with only a small amount of ash, and has a heating capacity of 7,500 calories.
Tzuchuan Coal, which rivals the best Cardiff Coal, is highly recommended for Coke and Briquette manufacture, for Boiler and Marine use and for General Domestic use
Tokuyama Briquette Factory, Yawata Iron and Steel Works, and many other important works in Japan and China are constant purchasers.
The Wharves at Tsingtao are well accommodated as Coaling Stations for Coast and Ocean liners.

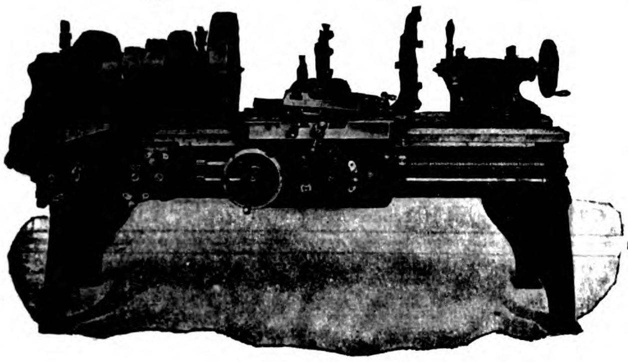
For further information please apply to the

SHANTUNG RAILWAY ADMINISTRATION

Cable Address: "SANTETSU" **TSINGTAO, CHINA** **Codes: A.B.C. 5th Ed. & A.1.**

AMERICAN

THIS is one reason why "**American" Lathes** wear better and remain accurate longer than the ordinary lathe. The illustration at the top shows the density of the iron in "American" Lathe beds. This hard, close-grained iron is secured by an elaborate chilling process and imparts to the Lathe longer life, less wear and better service. There are other features of vital interest to lathe users. Be sure to learn about them before deciding upon your next Lathe.



The American Tool Works Co.
CINCINNATI, U. S. A.

Lathes - Planers **Shapers - Radials**

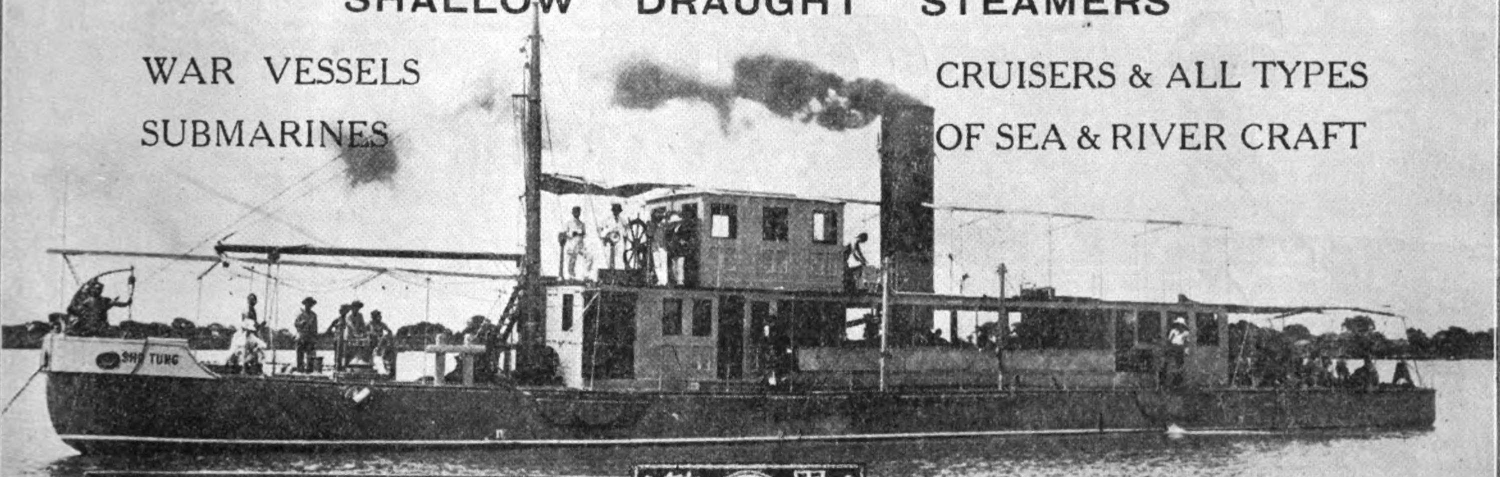
Agents: Andersen, Meyer & Co., Ltd., Shanghai and Manchuria
Horne Co., Ltd., Tokio, Japan
H. P. Gregory & Co., Sydney & Melbourne
Pacific Commercial Co., Manila, P.I.
Honolulu Iron Works, Honolulu, H.I.

THORNYCROFT

SHALLOW DRAUGHT STEAMERS

WAR VESSELS
SUBMARINES

CRUISERS & ALL TYPES
OF SEA & RIVER CRAFT



All types of River and Ocean Craft
Steam or Motor propelled. Stern Wheel or Tunnel Stern

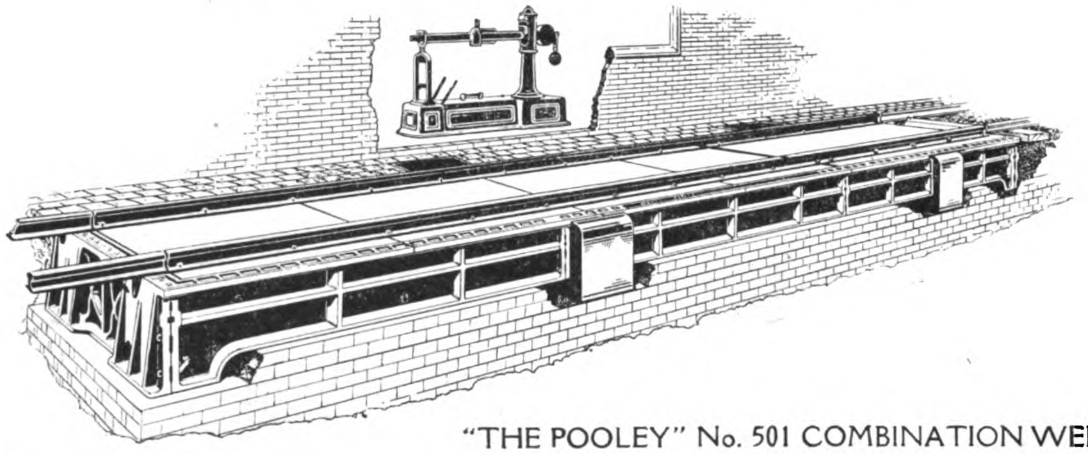
Motor Boats to 40 knots
Water Tube Boilers
Marine Engines

Cargo Steamers to 5,000 tons.
Steam Turbines
Oil Fuel Gear

Marine Motors for Petrol or Paraffin
Stationary Oil Engines for Electric Lighting, Pumping and Power Plants
JOHN I. THORNYCROFT & CO., LTD.
10 Kiukiang Road : : Shanghai
London, S.W. 1, England. Works: Southampton

POOLEY

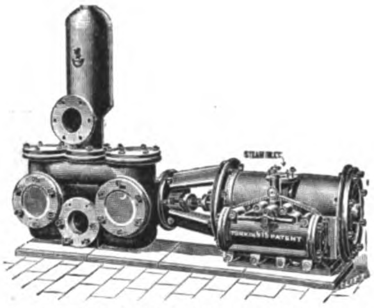
WEIGHING MACHINE & WEIGHBRIDGE MAKERS



"THE POOLEY" No. 501 COMBINATION WEIGHBRIDGE,
CAPACITY 70 TONS, SPECIALLY DESIGNED FOR CHINA.

HENRY POOLEY & SON L^TD
JOHN BRIGHT ST
BIRMINGHAM
ENGLAND

P.A. 123.



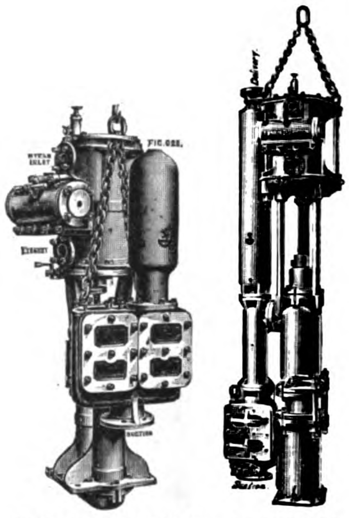
STEAM PUMP for General Purposes

WE MANUFACTURE

PUMPS

FOR EVERY PURPOSE

To be worked by HAND, STEAM, BELT, WIND, WATER or ELECTRIC POWER.



SINKING PUMPS for COLLIERIES, MINES, Etc.

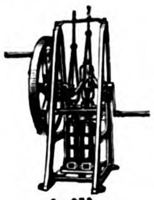
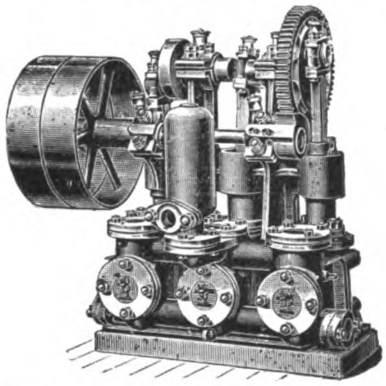


FIG. 229.

FIG. 160.



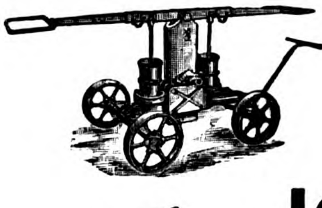


FIG. 191.

Write for "Eastern" List.

JOSEPH EVANS & SONS

(WOLVERHAMPTON) LTD

CULWELL WORKS,

WOLVERHAMPTON, ENGLAND.

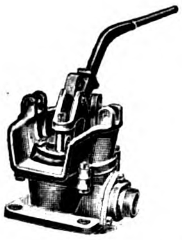


FIG. 185.

Agents for China

J. WHITTALL & CO., LTD.

16 Victoria Terrace, Tientsin
12 Nanking Road, Shanghai
33 Ta Juan Fu Hutung, Peking

Stocks Kept in Tientsin and Shanghai.

DORMAN, LONG & Co., Ltd.

Steel Manufacturers,

Bridge Builders & Constructional Engineers,

MIDDLESBROUGH, ENGLAND.

Telegraphic Address:
"DORMAN-MIDDLESBROUGH."

Codes —
BENTLEY'S; A.B.C. (5th and 6th Editions)
and WESTERN UNION (Universal & 5 Letter).

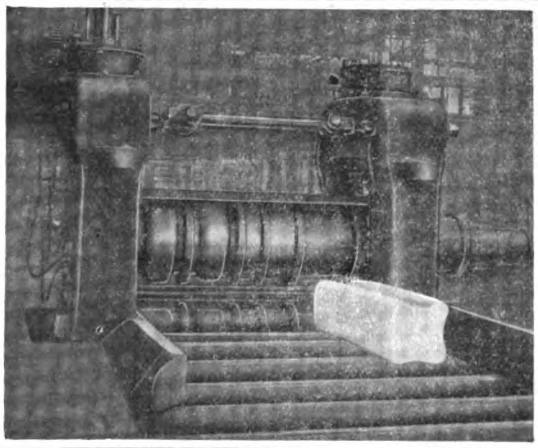
Britannia Steelworks,

MIDDLESBROUGH.

Open-Hearth
STEEL JOISTS,
ANGLES and
OTHER SECTIONS,
RAILS.

Open-Hearth STEEL BARS in long lengths suitable for

FERRO-CONCRETE WORK, BILLETS AND BLOOMS.



Redcar Iron and Steel Works, Redcar.

Steel Works and Rolling Mill Dept.
Plate Mills capable of Rolling all Plates for **Shipbuilding and Engineering** purposes, from $\frac{3}{16}''$ to $1\frac{1}{2}''$ thick, fulfilling the requirements of British Standard Tests, Board of Trade, Admiralty, Lloyds, etc.
Universal Plates with Rolled Edges 12" to 42" wide up to 90-ft. long.

Clarence Steel Works and Rolling Mills,

PORT CLARENCE.

High-class Steel in quality from Dead Soft to 1.25 per cent. Carbon for the manufacture of Wire, Springs, Files, Saws, Forgings, Stampings, Rifle Barrels, Agricultural Implements, etc. Conductivity Steel to stand General Post Office, India Office and British Railway Tests.
Electrically Melted Steels of all Carbons.

NICKEL ALLOY STEEL.

Flange and Bulb Head Rails, Billets, Slabs, etc.

Ayrton Rolling Mills,

MIDDLESBROUGH.

Galvanized Corrugated and Plain Sheets,

Ridging, Gutters, Downpipes, Fountain Heads, etc.

Ordinary Galvanized Fittings kept in Stock.

Cleveland Wire Mills,

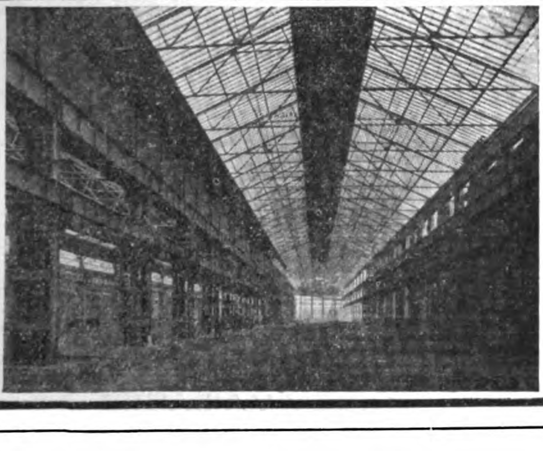
MIDDLESBROUGH.

Wire Rods and all kinds of Wire for all purposes. Telegraph & Telephone Wire. Annealed Core Wire. Galvanized Seizing Wire. Galvanized Rigging Wire. Galvanized & Varnished Fencing Wire. Galvanized Strand & Barb Wire. Galvanized Cable Wire.

Galvanized Patent Steel Hawser Wire to Lloyd's Tests.

Bright Patent and Plough Steel Rope Wire.

The Mills can supply the **longest single length** of Rods or Wire without weld or joint of anyone in the Trade.



Constructional Department,

MIDDLESBROUGH.

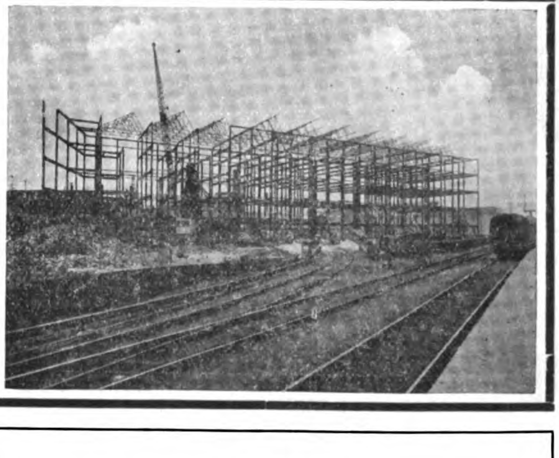
STRUCTURAL STEELWORK

for all purposes.

Speciality:

STEEL FRAME BUILDINGS

for home and abroad.



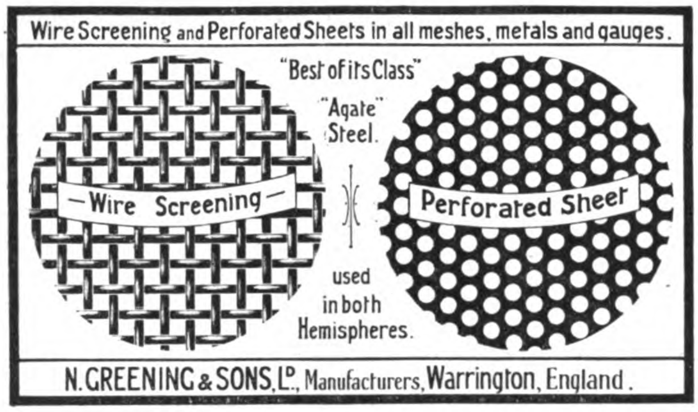
AGENTS:—

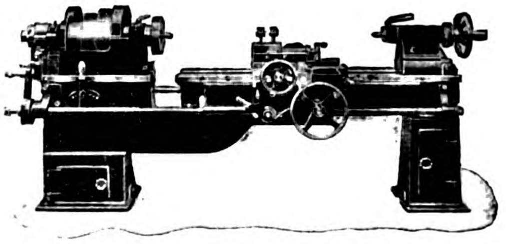
REPRESENTATION for BRITISH MANUFACTURERS, LTD.

CHING MING BUILDINGS,
BRITISH CONCESSION,
HANKOW.

43 KIANGSE ROAD,
SHANGHAI.

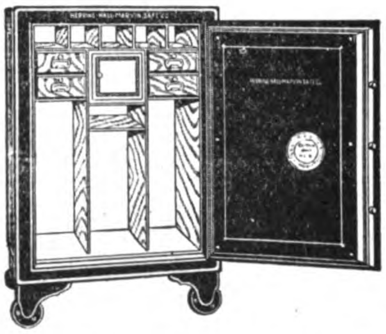
REGINES BUILDINGS,
LEGATION STREET,
PEKING.





HEAVY
DUTY
LATHES

7-in. and 9-in. Centres
HIGH-CLASS MACHINES AT MODERATE PRICES
S. W. CLOUGH
REDBURN LATHE WORKS
SHIPLEY, Eng.



Unfailing Protection For Your Most Valued Possessions

HERRING-HALL-MARVIN
Safes and Bank Vaults

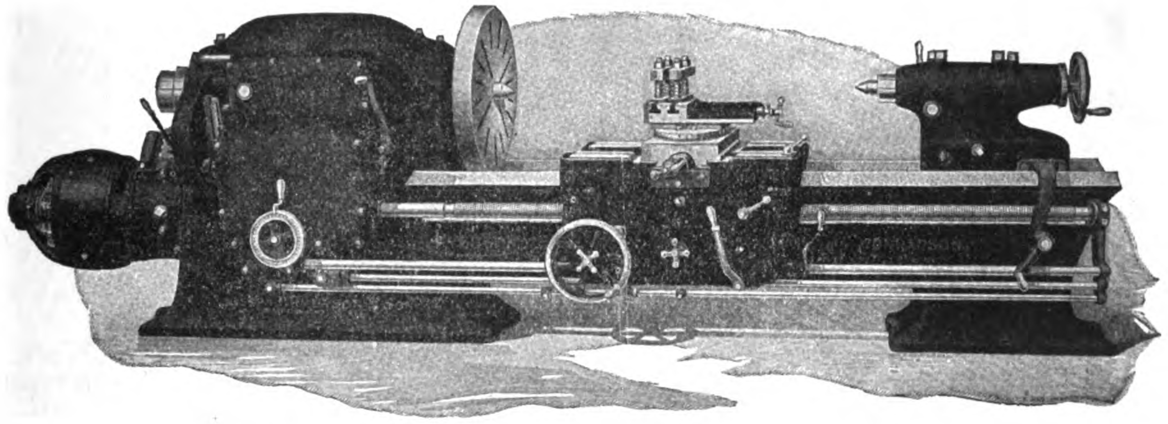
All sizes from the smallest Home Safe to the largest Bank Vaults, Key-Lock or Combination.

MUSTARD & COMPANY
Sole Agents for China, Hongkong and Macao.
Shanghai, Tientsin, Hankow, Hongkong, Canton, Harbin.

THE
MUNICIPAL ELECTRICITY DEPARTMENT
HAS RECEIVED DEMANDS FOR
ELECTRIC POWER
AMOUNTING TO
80,000 HORSE POWER
AND PLANS TO INCREASE ITS GENERATING PLANT TO A CAPACITY OF
180,000 HORSE POWER

? DO **YOU** THINK
IT IS POSSIBLE TO MAKE YOUR OWN POWER AT A COST WHICH CAN COMPETE
WITH THE **CHEAP RATES** MADE AVAILABLE
BY THE OPERATION OF THIS VAST MODERN POWER PLANT? ?

ASK
THE POWER DEPARTMENT, FOOCHOW ROAD, SHANGHAI
TELEPHONE FOR AN APPOINTMENT TO CENTRAL 283.



Ryerson-Conradson Selective Head Engine Lathes

U. S. and Foreign Patents

The Ryerson-Conradson High Power Precision Selective Geared Head Engine Lathes can be employed for quantity production as well as general machine shop work. We are manufacturing these lathes in five sizes, 15″, 18″, 22″, 27″, and 33″ swing with any length of bed arranged for single pulley or constant speed motor drive equipped with mechanical spindle reverse.

Special Features in the Design, Construction and Operation

Head stock cast integral with bed.

Splash oiling system. (All gears running in bath of oil.)

Extra large spindle and spindle bearings. (27″ lathe front spindle bearing, 6¾″ x 10″. Hole through spindle, 4¼″.)

Herringbone gear drive to spindle.

Exceptional speed range. (12 speeds, 28 feeds.)

All gears permanently in mesh.

All operations controlled from apron.

Ways have large bearing surface and are of new design.

Special design of apron feed mechanism.

Weight commensurate with liberal size of all parts.

We manufacture a complete line of machinery, comprising everything for the boiler, structural, bridge, railway, and general machine shop, such as Friction Saws, Punches, Shears, Riveters, Bending Rolls, Lathes, Planers, Shapers, Millers, Drill Presses, etc.

A bulletin on any particular machine or a complete catalogue on all Ryerson Machinery will be mailed at your request.

JOSEPH T. RYERSON & SON

ESTABLISHED 1842 INCORPORATED 1888

NEW YORK
BUFFALO

CHICAGO, ILL., U. S. A.

ST. LOUIS
DETROIT

Cable Address: Ryson, Chicago. Telegraphic Codes: Bentley's, Western Union (5 Letter and Universal Editions), Lieber's, A. B. C. (5th Edition), Ryerson.

RYERSON

TRADE MARK
S

CABLE ADDRESS: "SUGAR," TOKYO
CODE: A.B.C. 5TH EDITION
Head Office:
No. 12 Sanchome, Kakigara-Cho,
Nihonbashi-Ku, TOKYO

RAW SUGAR REFINED

THE JAPAN SUGAR CO., LTD.
(DAI NIPPON SEITO KABUSHIKI KAISHA)
CAPITAL: YEN 18,000,000; PAID-UP: YEN 12,000,000

TRADE MARK
S

J. WHITTALL & CO., LTD.

TIENTSIN — ENGINEERS AND MERCHANTS SPECIALISTS IN — PEKING

MINING, RAILWAY AND TEXTILE MACHINERY

Agents in North China for:

HADFIELDS, LTD.
Mining and Light Railway Material of all Kinds

BELLIS & MORCOM, LTD.
Engines, Turbines, Condensers and Air Compressors

CROMPTON & COMPANY, LTD.
Electrical Generators and Motors

JOHNSON & PHILLIPS, LTD.
Electrical Cables and Transformers

M. B. WILD & COMPANY, LTD.
Winding and Hauling Machinery

HOWARD & BULLOUGH, LTD.
Textile Machinery and Cotton Mill Accessories

WARRINGTON WIRE ROPE WORKS, LTD.
Steel Wire Ropes

JOSEPH EVANS & SONS, LTD.
Mining Pumps

LEWIS BERGER & SONS, LTD.
Paints

Codes : Engineering 2nd Ed. A.B.C., 5th Ed. Bentley's: Kendall's: Scholfields: Private

Telegrams: "*Whittal.*"

DIVING APPARATUS

OF ALL PATTERNS IN USE TO-DAY

Contractors to . . .

BRITISH ADMIRALTY
WAR OFFICE,
INDIA OFFICE,
TRINITY HOUSE, etc.

Prompt shipment of complete sets and accessories of every description

Immediate Delivery

ALSO MAKERS OF

SMOKE HELMETS for Steamships, Oil Tankers, Oil Companies, Chemical Works, etc.

OXYGEN BREATHING APPARATUS For Rescue Work in Mines

MEDICAL OXYGEN APPARATUS for Resuscitation purposes

Oxygen Supplies of every description

Air Compressors Vacuum Pumps

SIEBE, GORMAN & CO., LTD.

187 WESTMINSTER BRIDGE ROAD,

LONDON, ENGLAND

Agents for Japan, Formosa, Korea and South Manchuria : Mitsui Bussan Kaisha, Ltd.

Agents for China · Jardine, Matheson & Co., Ltd.

Cables: "SIEBE, LONDON."

Codes used: A.1, A.B.C. (5th Edition), Western Union, Engineering & Private

TRIMO WRENCHES

Pipe Wrench

Supplied with steel frames that do not break, nut guards that keep the adjusting nut from being turned accidently in close quarters, and inserted jaws in end of handle that can be removed when worn, saving the handle.

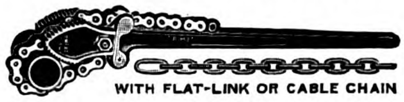
There are other superior points that every user of Trimo Pipe Wrenches knows—all for economy to the user.

Nut Wrench

Trimo Pipe Cutter

As a 1 or 3 Wheel Cutter

Trimo Chain Wrench



WITH FLAT-LINK OR CABLE CHAIN

TRIMONT MFG. CO.,

Roxbury (Boston), Mass.

Finishing Machinery

THE illustration is one of our Calenders of the heaviest and most powerful type for the production of the well-known "Silk Finish" on cotton goods by embossing a series of very fine lines on their faces. These Calenders can be driven by electric motor, by double cylinder diagonal steam engine, or by pully and clutch.

Mather & Platt, Ltd.

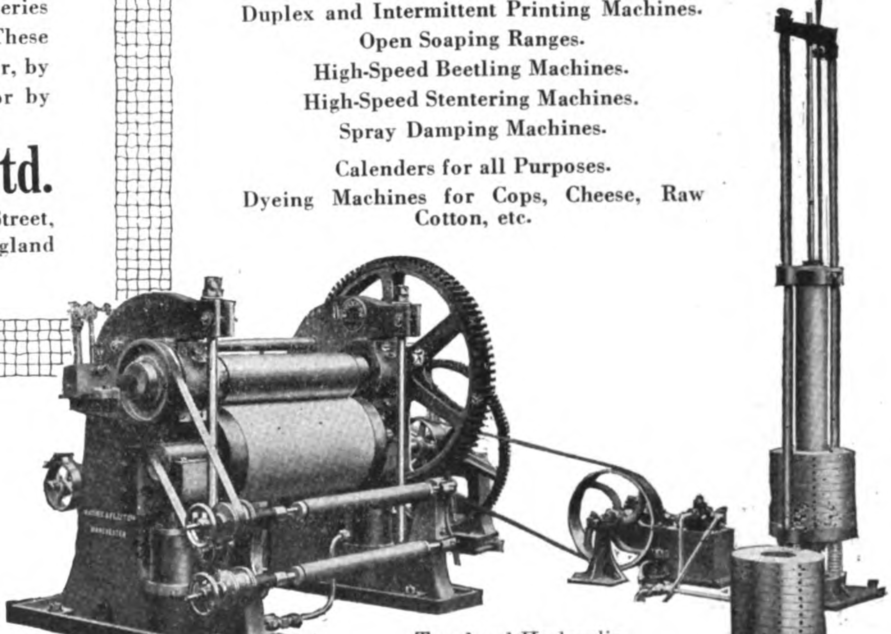
Park Works, Manchester.

14 Great Smith Street, London, S.W. England

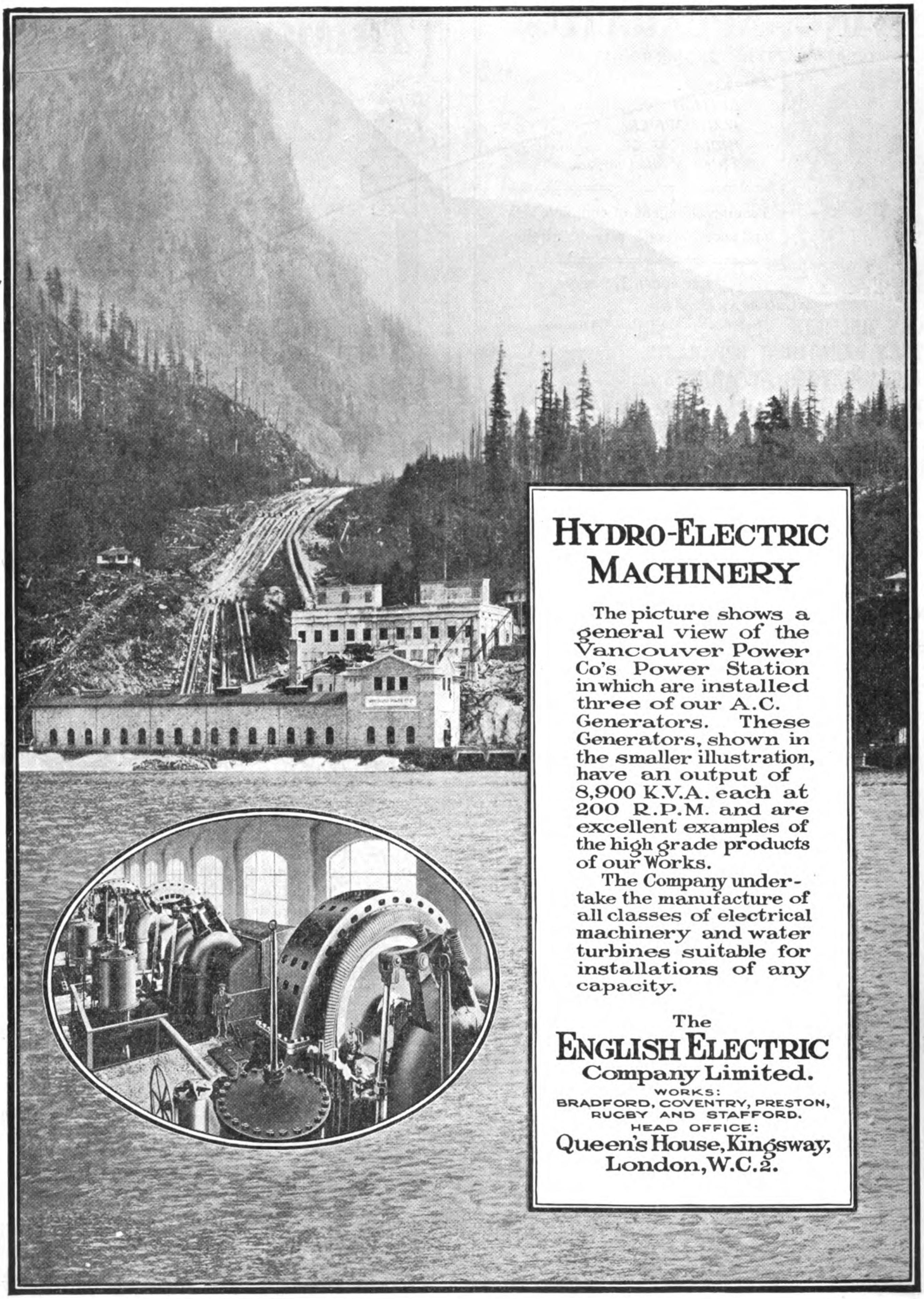
47 Szechuen Road, Shanghai

Some Specialities:

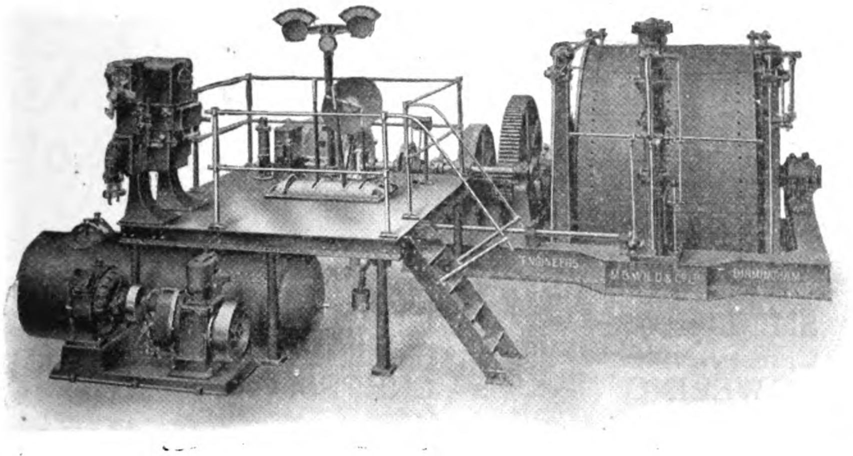
Gas Singeing Machines. Mather Kiers.
Open Width Bleaching Machinery.
Mercerising Ranges.
Duplex and Intermittent Printing Machines.
Open Soaping Ranges.
High-Speed Beetling Machines.
High-Speed Stentering Machines.
Spray Damping Machines.
Calenders for all Purposes.
Dyeing Machines for Cops, Cheese, Raw Cotton, etc.



Two-bowl Hydraulic Lustring Calender



China Office: JARDINE, MATHESON & CO., LTD., Engineering Dept., 8a Yuen-Ming-Yuen Road, Shanghai
Japan Office: ENGLISH ELECTRIC CO., LTD., 3 Itchome, Uchisaiwaicho, Kojimachi-Ku, Tokyo



ONE of the recent productions turned out from our works. Every machine, in fact every part, is carefully designed to efficiently and economically perform its particular duties.

Your requirements will have our careful study, and designs and full particulars submitted upon application.

REGISTERED TRADE MARK

M. B. WILD & CO., LTD.

NECHELLS, BIRMINGHAM,
ENGLAND

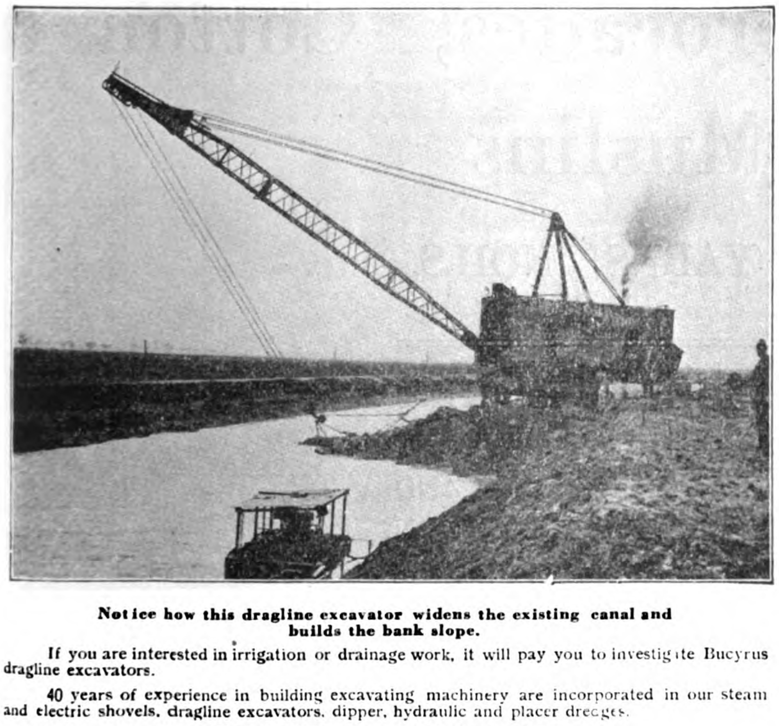
Telephone : Birmingham, East 208. *Telegrams :* 'Hauling,' Birmingham.

Codes : A B C (5th Edition), Liebers, Bentleys.

BUCYRUS

TRADE-MARK Registered

DRAG-LINE EXCAVATING MACHINERY



Notice how this dragline excavator widens the existing canal and builds the bank slope.

If you are interested in irrigation or drainage work, it will pay you to investigate Bucyrus dragline excavators.

40 years of experience in building excavating machinery are incorporated in our steam and electric shovels, dragline excavators, dipper, hydraulic and placer dredges.

BUCYRUS COMPANY

South Milwaukee, Wisconsin, U.S.A.

Cable Address: "BUCYRUS, SOUTH MILWAUKEE"

London Office: BUCYRUS COMPANY, 19, Iddesleigh House, Caxton Street, Westminster.

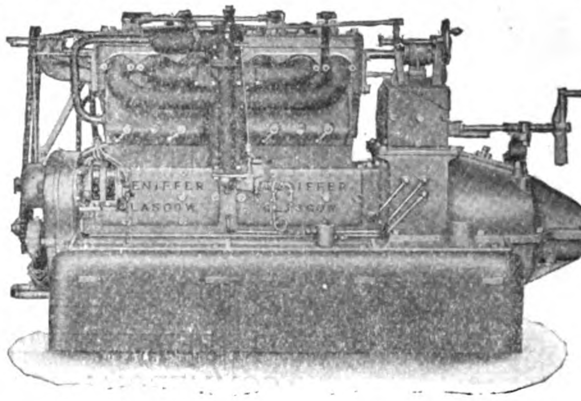
Agents in Siam : D. Couper-Johnston & Co., Bangkok, Siam.

Agents in India : McLeod & Co., Calcutta and Bombay, India.

Agents in Malay States : The Borneo Company, Ltd., Singapore, S.S.

GLENIFFER

KEROSENE & PETROL MARINE MOTORS



FOR ALL TYPES OF BOATS

RANGE OF MODELS—10 TO 90 H.P.

AGENTS:—Douglas and Grant Ltd.—at Madras, Rangoon, Bangkok, Saigon, and Haiphong.
Ritchie and Bisset—at Singapore.
British and Dutch Engineering Co., Ltd.—at Batavia and Soerabaia.

GLENIFFER MOTORS LTD.

ANNIESLAND, GLASGOW, SCOTLAND.

TELEGRAMS: "GLENGINE, GLASGOW."

JAPANESE
TEXTILES
FOR EXPORT

Standard Printed and Dyed Cotton and Silk Fabrics

SHIRTINGS	SHEETINGS	DRILLS
PRINTS	CRETONNES	FLANNELETTES
DAMASKS	TOWELING	CREPES
	ETC. ETC.	
PONGEES	BROCADES	SATINS
CREPES	SILKS	

FUJI GASSED SPINNING COMPANY, LIMITED

(FUJI GASU BOSEKI KABUSHIKI KAISHA)

Head Office:
GOCHOME, OSHIMA-MACHI
NEAR TOKYO
CABLE ADDRESS: "FUHO"

CAPITAL - Yen 38,000,000
OPERATING
450,000 Spindles and
1,775 Looms

Business Office:
SHICHOME, HAKOZAKI-CHO,
NIHONBASHI-KU,
TOKYO

Silks, Crepes, Brocades, Cotton Cloths, Muslins

SILK AND COTTON YARNS, NOILS, etc.

OUR EXPORT DEPARTMENT
IS REPRESENTED IN ALL THE IMPORTANT COMMERCIAL CENTERS OF THE WORLD AND CAN FURNISH PROMPTLY FULL INFORMATION AND QUOTATIONS REGARDING THE LARGE VARIETY OF TEXTILES MADE IN OUR MILLS

KANEGAFUCHI SPINNING COMPANY, LIMITED

HIGASHI-SHIRIIKE, KOBE, JAPAN

AVERY

The Importance of accuracy.

THE PARAMOUNT FACTOR IN ALL WEIGHING OPERATIONS, IS ACCURACY.

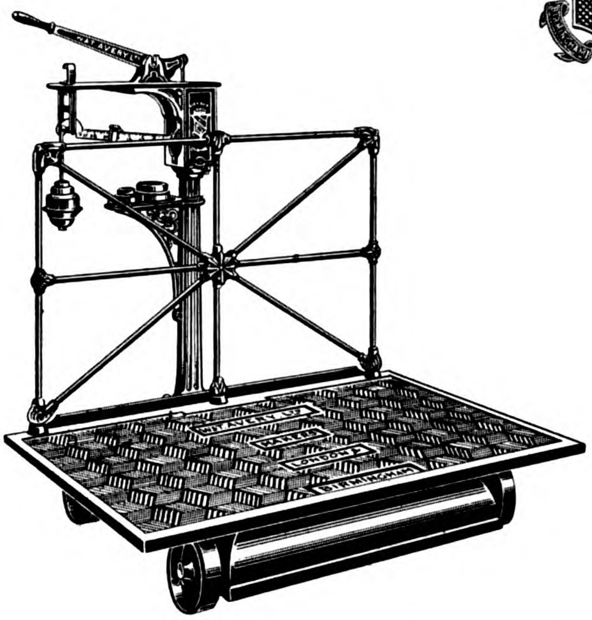
IT IS VITALLY IMPORTANT WHERE ESTIMATES OF VALUE, ARE DETERMINED BY WEIGHT.

LOSSES DUE TO UNRECORDED INACCURACIES ARE UNRECOVERABLE, THEREFORE THE VALUE OF ACCURACY IS INDISPUTABLE.

THE HIGH DEGREE OF ACCURACY AND ALL-ROUND EFFICIENCY OF

AVERY MACHINES

IS "PRACTICAL REASON" WHY THEY MAINTAIN SUPREMACY IN THE MARKETS OF THE WORLD



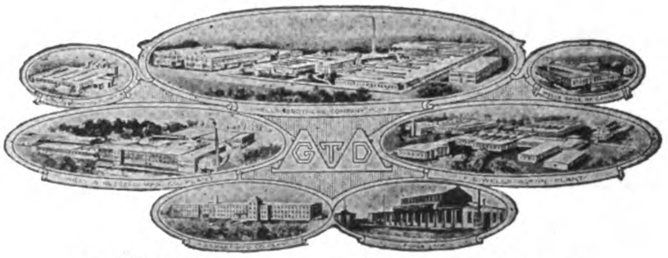
Agents:

JARDINE, MATHESON & CO., LTD.
SHANGHAI.

W. & T. AVERY LTD
SOHO FOUNDRY
BIRMINGHAM, ENGLAND.

AQ.476.

You need these tools from GTD



Plants of GTD Corporation, World's Largest Manufacturers of Screw-threading Tools

1

2

3

1 The GTD Opening Die Stock is a hand tool which cuts an unusually accurate thread and requires slight effort to operate. After the thread is cut the die may be released, and pulled straight off the work. No time wasted in unwinding. Furnished to cut either Whitworth or USS threads.

2 *"Little Giant"* screw-plates contain assortments of tools for cutting screw-threads by hand:—taps, dies, die stocks and tap wrenches. Made by GTD in assortments suitable for every threading need. Look for the brand names, *"Little Giant," "O. K.," "Lightning"* and *Green River"* on screw-plates.

3 No. 490 GTD Adjustable Reamer can be adjusted to cut larger or smaller than normal. A very necessary tool for fitting tight pulleys, gears, etc. GTD makes an excellent line of reamers for all purposes including hand, expansion, taper, special Ford car reamers, repairman's taper reamer, etc.

WE invite you to send for booklets and catalogs descriptive of our tools. We will be pleased to place at your service our nearly fifty years of experience in making fine tools if you will fill out the coupon and mail it in. We will supply you with the latest information concerning the tools indicated, and place your name on our mailing list to receive additional information as issued.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASS., U.S.A.

Canadian Plant: Greenfield Tap & Die Corporation of Canada, Limited, Galt, Ontario.
Cable address: "Getede"

Horne Company, Ltd.
6-7 Takayama-Cho, Kyobashi-Ku
Tokyo, Japan

Muller, Phipps & Sellers, Ltd.
17 Itachibori Kitadori
5-chome, Nishi-Ku
Osaka, Japan

Fudo Bank Bldg., 9.2-chome
Honkokucho, Nihonbashiku
Tokyo, Japan

Muller & Phipps (Asia) Ltd.
P. O. Box 25, Prince's Bldg.,
Hongkong

Muller & Phipps (China), Ltd.
1B Jinkee Road
Shanghai, China

Dodge & Seymour (China) Ltd.
18 Museum Road
Shanghai, China

GTD Corporation
Greenfield, Mass. U.S.A.

Please send me catalogs and booklets descriptive of the tools I have checked, and add our name to your permanent mailing list for further information as issued.

☐ Production Threading Tools
☐ Repair Threading Tools

Name Position
Firm
Address F.E.R. 919

Jardine, Matheson & Co., Ltd.

CANTON HANKOW ICHANG TIENTSIN
CHENGTU HARBIN PEKING TSINGTAO
CHUNGKING HONGKONG SHANGHAI ETC.

Engineering Show Room: 8A YUEN-MING-YUEN ROAD, SHANGHAI

Sole Agents for Associated British Machine Tool Makers, Limited.

Comprising the following Firms :—

JAMES ARCHDALE & CO., LTD, Birmingham.
WILLIAM ASQUITH, LTD., Halifax.
J. BUTLER & CO., Halifax.
THE CHURCHILL MACHINE CO., LTD., Manchester.
DEAN, SMITH & GRACE (1908), LTD., Keighley.
KENDALL & GENT, LTD., Manchester.
JOHN LANG & SONS, LTD., Johnstone, Glasgow.
J. PARKINSON & SON, Shipley.
GEO. RICHARDS & CO., LTD., Broadheath, Manchester.
THOMAS SHANKS & CO., Johnstone, Glasgow.
SMITH & COVENTRY, LTD., Manchester.
H. W. WARD & CO., LTD., Birmingham.

The full range of Machine Tools manufactured by this combination is as follows:

LATHES

Sliding Surfacing and Screwcutting Lathes, Plain Lathes, High Speed Lathes, Axle Lathes, Toolroom Lathes, Surfacing and Boring Lathes, Vertical Boring Lathes, Cutting-off Lathes, Heavy Forge Lathes, Gun Lathes, Shafting Lathes, Break Lathes, Wheel Lathes, Relieving Lathes, Capstan, Turret and Brassfinishers Lathes of all types. Chucks and Self-opening Dieheads.

DRILLING MACHINES

Radial Vertical Drills of all sizes. Girder, Portable and Multiple-spindle Radials, Pipe-flange Drilling and Facing Machines, Ball-bearing Sensitive Multiple Drills and High-speed Drilling Machines.

MILLING MACHINES

Plain, Vertical, Horizontal and Universal Milling Machines, Plano-Milling Machines, Keyway and Slot Drilling Machines, Thread Milling Machines.

PLANING AND SHAPING MACHINES

Planing Machines in all sizes. Armour-plate Planing Machines, Pillar and Traversing Head Type Shaping Machines, Spiral Bevel Gear Planers, Side Planing Machines, etc.

BORING MACHINES

Horizontal Boring Machines, Special Boring Mills for Turbine Casings, Tyre Boring Machines.

GRINDING MACHINES

Twist Drill Grinding Machines, Cylindrical Grinders, Crank Shaft Grinders, Cam Grinders, Universal Chucking Grinders, Internal Grinders, Piston Ring Grinders, Wet Tool Grinders, Cutter Grinders, etc.

SLOTTING MACHINES

All types including High Speed and Portable Slotting Machines.

MISCELLANEOUS

Cutting-off Machines, Bolt Screwing Machines, Gun-boring, Lapping and Rifling Machines, Centring and Facing Machines, Nut Facing Machines, Universal Sharpening Machines, Mandrel Presses, Sand Blasts, Air Compressors, Broaching Machines, Twist Drills and Vices of all kinds.

ENQUIRIES SOLICITED

TUBES

IRON, STEEL, BLACK, GALVANISED

BOILER TUBES

Gas Water and Steam Tubes and Fittings
Boring & Casing Tubes
Tubular Coils for Heating and other Purposes.

STC

Sole Licensees in Great Britain for the Manufacture of

"ARMCO" Rust and Corrosion Resisting Iron Tubes

Write for Descriptive Pamphlet

THE SCOTTISH TUBE CO., LTD.

Head Office: 34 Robertson Street, GLASGOW.

Branch Offices—London, Manchester, Leeds, Liverpool, Newcastle-on-Tyne, Cardiff, Sydney, N.S.W.; Wellington, N.Z., Johannesburg, Cape Town and Durban, S.A.

Works—Glasgow, Govan, Coatbridge, Rutherglen and Garnkirk.

Telegraphic Address: "Scotubeco" Glasgow. Codes: A1, A.B.C. (4th & 5th Editions), Lieber's, Bentley's, Western Union and Private.

The Pneumercator Tank-Gauge

(PATENTED)

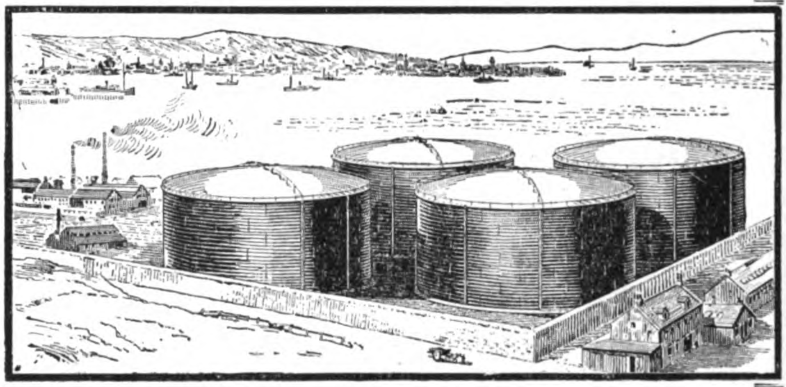
Measures and Weighs

FUEL OIL

or Any Liquid,
in Any Tank,
at Any Distance

Unaffected by Changes of Temperature.

NO FIRE RISKS.



WRITE FOR DESCRIPTIVE BOOKLET.

Sole Manufacturers for GREAT BRITAIN and EUROPE, INDIA, CHINA, AUSTRALIA, NEW ZEALAND, SOUTH AFRICA, ARGENTINE REPUBLIC, CHILE

KELVIN BOTTOMLEY & BAIRD LTD

MANUFACTURERS OF THE LATE LORD KELVIN'S INVENTIONS AND OTHER INSTRUMENTS

18 CAMBRIDGE ST. GLASGOW

Consolidated Steel Corporation

25 Broadway, New York, U.S.A.

SHANGHAI OFFICE: GLEN LINE BUILDING, 1-A PEKING ROAD, SHANGHAI
TOKYO OFFICE: 21 NIGASHI DORI MARUNOUCHI
CALCUTTA OFFICE: 6 HASTINGS STREET
BRANCH OFFICES AND REPRESENTATIVES IN PRINCIPAL COUNTRIES THROUGHOUT THE WORLD

CABLE ADDRESS: CONSTECO, NEW YORK

Cable Codes: **Consolidated Steel Corporation, Western Union, A B C Fifth Edition Improved, Scott's 10th Edition, Bentley's Complete Phrase, Lieber's**

SOLE EXPORTER OF THE COMMERCIAL PRODUCTS OF

BETHLEHEM STEEL COMPANY
BRIER HILL STEEL COMPANY
CAMBRIA STEEL COMPANY
LACKAWANNA STEEL COMPANY
LUKENS STEEL COMPANY
MIDVALE STEEL & ORDNANCE COMPANY
REPUBLIC IRON & STEEL COMPANY
SHARON STEEL HOOP COMPANY
TRUMBULL STEEL COMPANY
WHITAKER-GLESSNER COMPANY
YOUNGSTOWN SHEET & TUBE CO.

CONSTECO

TRADE MARK

We invite and will give prompt attention to inquiries for all forms of iron and steel products, including the following:—

PIG IRON	Basic, Bessemer, Foundry, and Malleable.
SEMI-FINISHED STEEL	Ingots, Billets, Blooms, Slabs, Skelp and Sheet Bars.
RAILWAY MATERIAL	Rails with Complete Accessories; Standard, Girder, Guard and High T-Rails; Steam and Electric Railway Frog and Switch Material; Special Track Work, including Switch Stands. Tires, Steel Tired Wheels, Rolled Steel Wheels; Locomotive and Car Axles, Loose and Mounted; All Steel Passenger Cars; Open Freight and Tank Cars; Forged Steel Locomotive and Car Parts; High Speed and Carbon Tool Steels.
STRUCTURAL STEEL	For Bridges, Buildings, Cars, Locomotives, Ships, etc. Plates, Sheared and Universal Mill, for Tank, Boiler, Ship, Firebox, Steel Bottom, etc. Angles, both Standard and Bethlehem, Special Sections, Channels, Shapes and Beams. Piling—Consteco-Lackawanna Sheet Piling (manufactured by Lackawanna Steel Company). Bars—Merchant Steel, Reinforcing, Refined Iron, Double Refined Iron, Staybolt Iron, Tool Steel, etc. Fabricated Structural Steel for Bridges, Buildings, Towers and other Structures.
TUBULAR PRODUCTS	Boiler Tubes, Lapwelded, Open-Hearth Steel and Genuine Knobbled Charcoal Iron; English Standard Steel Tubes, Gas and Steam Weights; Black and Galvanized and Red Painted American Standard Full Weight Pipe, American Standard Extra Heavy Pipe, Black and Galvanized. Line Pipe, Drive Pipe, Drill Pipe, and Oilwell Tubing. Standard Lapwelded and Special California Casing, Rigid and Flexible Electric Conduit.
SHEET AND TIN MILL PRODUCTS	Galvanized, Flat and Corrugated Steel Sheets, Blue Annealed Sheets, Shovel Sheets, One Pass Cold Rolled Close Annealed Black Sheets, Enamelling Stock, Deep Drawing and Extra Deep Drawing Stock and Copper Bearing Sheets. Coke Tin Plate, Best Cokes, Full Finished Tin Mill Black, Taggers and Dairy Stock, Terne Plate.
WIRE PRODUCTS	Wire Rods of Bessemer and Basic Open Hearth Steel, both Low and High Carbon. Bright, Soft, Bright Hard Drawn, Black Annealed, Galvanized, and Coppered Round Steel Wire. Galvanized Barbed Wire, Galvanized Staples, Wire Nails, etc.
FLAT STEEL PRODUCTS	Hoops, Bands, Hot Rolled Strip, Cold Rolled Strip.
SPECIAL PRODUCTS	Forgings, Castings, Toolsteel, Alloy Steels, Special Steels, Circular Sections, etc.
BOLTS AND NUTS	Rivets, Track Bolts, Spikes, Turnbuckles and Washers.
MACHINERY	Machine Tools, Planers, Horizontal Boring Machines, Hydraulic Presses Complete, Pumps and Pumping Engines, Railway Shop Machinery, Shipyard Machinery, Rolling Mill Machinery and Equipment, and any other Special Machinery Designed to order.

CANADIAN CARBIDE GIVES MORE GAS PER POUND

AND GAS IS WHAT YOU ARE BUYING

Export Drum with Wood over Cask

Years of manufacturing experience, plus facilities for quantity production assure highest gas yield and moderate prices.

CANADA CARBIDE CO., LTD.

Power Building, MONTREAL, CANADA.

Manufacturers and Exporters of

"S" BRAND HIGH-GRADE CARBIDE OF CALCIUM

Cable Address: CARBIDE, Montreal, Canada

Western Union, Bentley's and A.B.C. 5th Edition Codes.

Through America

via

The Milwaukee Railway

(The Puget Sound Electric Route)

A short, quick, and most comfortable route across the American Continent over the

World's Longest Electrified Railroad

For 649 miles over four mountain ranges mighty electric locomotives, using "White Coal" for power haul the splendidly equipped all-steel transcontinental trains

"The Olympian" and "The Columbian"

from Seattle and Tacoma daily for Spokane, Butte, Minneapolis, St. Paul, Milwaukee and Chicago.

"The Pacific Limited"

from San Francisco to Chicago via Southern Pacific, Union Pacific and Milwaukee Railways.

At Chicago connections are made with fast express trains for the Atlantic Seaboard and all points east.

Rail orders and full information respecting train schedules, connections, fares, etc., on application to your steamship agent or at any office of Thos. Cook & Son in the Orient.

For sleeping car reservations, write, cable or wireless any of the following representatives of the

Chicago, Milwaukee & St. Paul Railway

Cable Address: "Milwaukee"

Seattle—J. F. Bahl, City Passenger Agent, 2nd and Madison
San Francisco—C. H. Miles, General Agent Passenger Dept., 995 Monadnock Bldg.
Vancouver—Geo. W. Hibbard, General Agent, 626 Hastings St., West
Victoria—F. O. Finn, General Agent, 902 Government St.
A. P. Chapman, Jr., Ass't Gen'l Passenger Agt., 663 Stuart Bldg., Seattle
Geo. B. Haynes, General Passenger Agent, Chicago

LIFTS

FOR ALL PURPOSES
FITTED WITH WORLD-FAMED VEE WHEEL DRIVE

MANUFACTURED BY

SMITH MAJOR & STEVENS LTD.

LONDON AND ABBEY WORKS, NORTHAMPTON

ENGLAND

EASTERN AGENTS:

CALCUTTA
MESSRS. JESSOP & CO., LTD.,
93 CLIVE STREET

SHANGHAI
MESSRS. SCOTT, HARDING & CO.,
6 PEKING ROAD

SINGAPORE
MESSRS. UNITED ENGINEERS, LTD.
5 BATTERY ROAD

EXCLUSIVELY USED BY BRITISH ADMIRALTY ON ALL LATEST BATTLESHIPS.

SALE & FRAZAR

S F S F

LIMITED
No. 1 Yayesucho, Kojimachi-Ku
TOKYO
Central Post Office Box No. 18

IMPORTS EXPORTS

Telegraphic Address: Since 1834 The Name "FRAZAR" For All Offices has been Connected WITH

ORIENTAL TRADE

BRANCHES - - - - Yokohama, Kobe, Osaka, Kyoto, Moji, Hakodate, Nagoya, Keijo (Korea), Taihoku (Formosa)' Mukden (Manchuria), Vladivostok (Siberia.)

AFFILIATED COMPANIES -
FRAZAR & CO., 30 Church St., New York, and Paris, Seattle, San Francisco.
FRAZAR TRUST CO., LTD., Tokyo and Yokohama.
FRAZAR FOREIGN TRADE BUILDING CO., New York.

CORRESPONDENTS - - -
SALE & CO., 21 Old Broad St., London, E.C.
F. G. SALE & SONS, 20 Bishops Gate, London, E.C.
E. W. FRAZAR & CO., 5 Rue de Paris, Tientsin and Peking, Harbin, Mukden.

WORLD-WIDE CONNECTIONS
EXCLUSIVE AGENCIES IN ALL LINES
LARGE STOCKS

A FEW OF OUR AGENCIES

MOTORCARS, TRUCKS, TRACTORS, ETC. Ford Motor Co., Hupmobile Motor Car Corp., Franklin Motor Car Co., Armstrong Siddeley Co., Ltd., Rolls Royce Co., Ltd., The White Co. (Trucks), Splitdorf Electrical Co.
MACHINE TOOLS. Joseph T. Ryerson & Son, Giddings & Lewis Mfg. Co., Wm. Sellers & Co., Inc.
RAILWAY EQUIPMENT. Baldwin Locomotive Works, W. H. Miner, Griffin Wheel Co., Duff Mfg. Co.
AVIATION EQUIPMENT: Handley Page, Ltd.
BRITISH STEEL and STEEL PRODUCTS. Jonas and Colver, Ltd., Smith & Coventry, Ltd., Sheffield Twist Drill & Steel Co., Ltd., Chubb & Son's Lock & Safe Co., Ltd.
CANNING MACHINERY and EQUIPMENT. American Can Co., Adriance Machine Works, Anchor Cap & Closure Co., Burpee and Letson Ltd., Seeley Brothers.
CANNED SALMON and CRAB from Kamchatka.
Fairbanks Morse & Co. Stationary and Marine Engines. Motors, Pumps, Wind Mills, complete Power and Lighting Plants.
Chain Belt Co., "Rex" Concrete Mixers.
J. L. Mott Iron Works, Plumbing Fittings and Supplies.
Shepard Electric Crane & Hoist Co., Cranes and Hoists.
Armour & Co., Canned Meats and Fruits, Soaps, Toilet Articles.
The Carnation Milk Products Co., "Carnation Cream."
The Glidden Co., Paints, "Jap-a-lac" Auto Finishes, Cold Water Paints, Wood Stains.
The Duratex Co., "Duratex" Leather Substitute and Rubber Coated Top and Curtain Materials.
S. C. Johnson & Son, Floor Wax, Paste, Liquid, and Powder.
The Klein Manufacturing Co., Technical Paints "Metal Crete" Concrete Hardeners, Cement Coating.
The Tungsten Wire Works (Stockholm), Wires for Filaments.
The Victor Talking Machine Co., Machines and Records.
The Graphoscope Development Co., Projectors and Films.
The Victor Typewriter Co., Standard Typewriters.
The Corona Typewriter Co., Folding Typewriters.
The Rolex Watch Co., Ltd., "Rolex" Watches.
Simmons Hardware Co., "Keen Kutter" and "Oak Leaf" Brands of Tools and Cutlery.
The Gillette Safety Razor Co., "Gillete" Blades.

MANY OTHER EXCLUSIVE AGENCIES

ROAD, EXCAVATING, POWER HOUSE, REFRIGERATING MACHINERY: STEEL and IRON PRODUCTS: "Gould" STORAGE BATTERIES.
RADIO APPARATUS, HEATING EQUIPMENT, FERTILIZERS, SAWN TIMBER CHEMICALS.
OUR SERVICE also covers BONDS and INVESTMENTS, FIRE and MARINE INSURANCE, SHIPPING, STORING, CHARTER, SALE and PURCHASE of STEAMERS.

INQUIRIES SOLICITED - If we cannot Supply your Requirements from Stock, we will be pleased to Recommend Local Alternatives or Advise Regarding Imports.

FIREPROOF
Ambler
Asbestos Corrugated Roofing

Made of selected asbestos fibres and the best hydraulic cement, compressed into compact sheets under three thousand pounds pressure per square inch, Ambler Corrugated Roofing and siding cannot burn, rust, rot, split nor leak. Made in sheets twenty-seven and one-half inches wide with eleven complete corrugations, and in lengths of four, five, six, seven, eight, nine and ten feet to be applied directly on purlins with lead washers and either bolts or aluminium tie wires, furnished. This material is unaffected by heat or cold or climatic conditions. Send for our data sheets showing method of use. Address all inquiries to Export Department "B."

"Permanent as the Everlasting Hills"

NO PAINTING—NO REPAIRING

Manufactured by

**Asbestos
Shingle, Slate & Sheathing
Company**

Ambler, Penna., U.S.A.

Distributors Wanted throughout the East

Cable Address:
"IWASAKISAL-TOKYO"

Code Used:
A. 1., A.B.C. 5th, Western Union, Bentley's Complete Phrase

MITSUBISHI SHOJI KAISHA, LTD.

(MITSUBISHI TRADING CO., LTD.)

Capital, fully paid-up - - - Y. 15,000,000

Head Office:
MARUNOUCHI, TOKYO.

Importers and Exporters, Manufacturers, Commission Merchants, Brokers, Ship Owners.

EXPORTING:

Coal, Copper and all Other Descriptions of Metals, Minerals and Cereals, Chemicals, Oil, Paper, Glass, Canned Fish, Silk Goods, and General Oriental Products and Merchandise

IMPORTING:

Iron, Steel, Machinery, Machine Tools, Chemicals, and General Merchandise

ANNUAL PRODUCTION:

Electrolytic Copper Ingots	20,000	Tons
Pig Iron	100,000	,,
Steel	50,000	,,
Coal	3,500,000	,,

COLLIERIES:

Takashima, Ochi, Yoshinotani, Kishidake, Namazuta, Shinnew, Hojo, Kanada, Kamiyamada, Ashibetsu, Bibai, O-Yubari, and Sakito

BRANCHES and AGENCIES:

Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

STEAMSHIP DEPARTMENT—KOBE

Fleet Owned	25,000	Tons	Gross
Chartered Steamers	12,000	,,	,,

Regular and Irregular Routes between home ports and Chinese and South Sea Islands Ports, etc.

MIIKE COAL

The Finest Steaming and Bunker Coals of the Far East are mined from the famed Miike, Tagawa, Yamano Sunakawa and Kawakami Collieries operated by the

MITSUI

MINING COMPANY, LTD.

HEAD OFFICE:
No. 1 Surugacho, Nihonbashi-Ku,
TOKYO, JAPAN

Capital - - Yen 100,000,000

Annual Coal Output is equal to one-quarter of Total Japanese Mines.

LEAD, SILVER, GOLD, ZINC, COPPER, SPELTER, SULPHUR, COKE, IRON, CHEMICALS and DYES

Are produced from the Company's, KAMIOKA, Lead, Silver and Zinc Mine; SANO, Copper and Zinc Mine; KUSHIKINO, Gold Mine; KONGO, Tungsten Mine; IWAONOBORI, Sulphur and Metal Mine; Zinc Plants, Coke, Dyestuffs and By-products Establishments in Miike.

Sole Agents for our Products:

MITSUI BUSSAN KAISHA, Ltd.

(MITSUI & Co., Ltd.)

Tokyo, London, New York, Shanghai, Hongkong, and other Principal Commercial Centres of the World.

SUPERHEATERS ELESCO

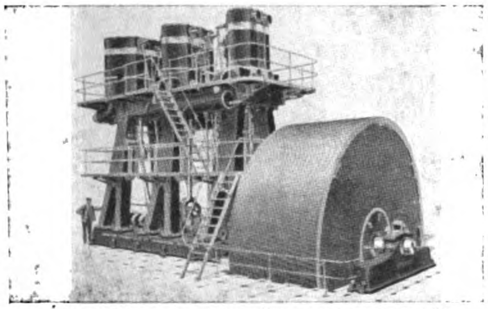
STEAM SUPERHEATERS for Locomotive, Industrial and Marine Service
Feed Water Heater Equipment for Locomotives
Boiler Feed Pumps Pipe Coils
Designing Engineers and Manufacturers

THE SUPERHEATER COMPANY

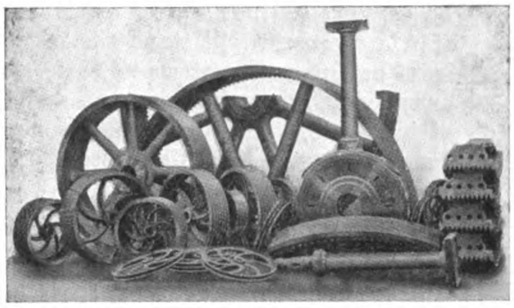
General Offices: 17 East 42nd St., New York, U.S.A.

ASHTON FROST & CO., LTD.

ESTABLISHED 1873.



MAKERS OF
STEAM ENGINES,
MILL GEARING,
DEEP WELL PUMPS,
SEWAGE PLANT,
ETC.



TELEGRAMS: "FOUNDRY."

WORKS: BLACKBURN, ENG.

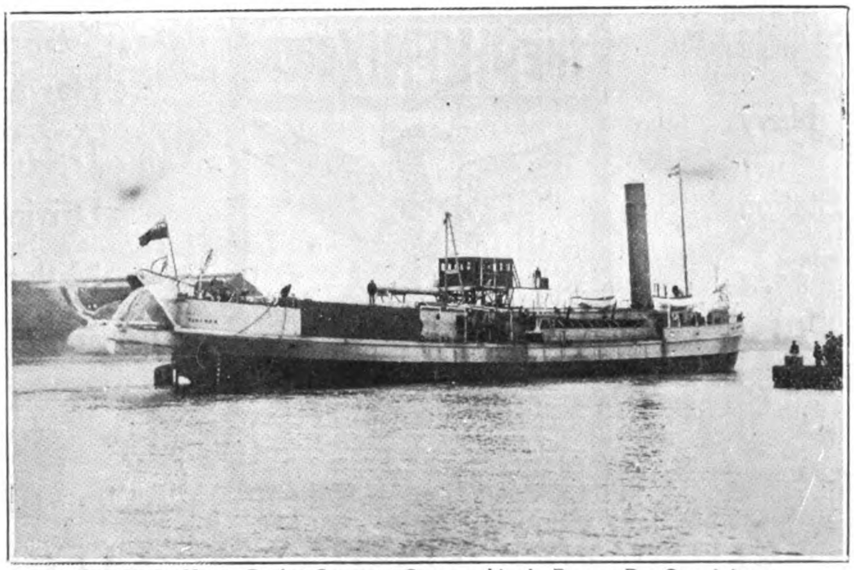
Wm. Simons & Co., Ltd., Renfrew

CONSTRUCTORS OF

Marine Dredging Plant

of most Modern and Improved Types and of the Greatest Capacities.

Constructors of Barge Loading, "Simons" Reclamation, Canal and Suction Cutter Hopper Dredgers. Hopper and Barge Loading Bucket Dredgers. Alluvial Dredgers. Trailing Suction Dredgers.



Drag Suction Hopper Dredger *Cormorant*, Constructed for the Rangoon Port Commissioners

Propelling and Dumb Hopper Barges.

Replace Parts supplied or fitted to existing Dredgers.

Inventors and First Constructors of "Hopper" and "Sternwell" Dredgers and Elevating Deck Ferry Steamers.

Head Office and Works: Renfrew, near Glasgow.

Telegrams: "Simons" Renfrew.

Established 1810

BEST PORTLAND CEMENT EMERALD BRAND

The Green Island Cement Co., Ltd.

SHEWAN, TOMES & CO.,

GENERAL MANAGERS, HONGKONG

Are You Going to Build?

Insist on your Architect specifying the use of the best brand of Portland cement in construction. If the house or factory is to be blocks or tiles, they should be of concrete, if stucco, only the best cement should be employed; if reinforced concrete is used, only a standard cement will stand the test; if your building is to be fireproof, waterproof, safe against earthquake or typhoon, improving with age, and lowering the cost of insurance, you must employ concrete, and the best concrete construction is only secured through the use of

Green Island Cement

Green Island Cement is supplied in Bags = 250-lbs. net, Casks = 375-lbs. net, Iron Drums = 375-lbs. net.

Also, Glazed Stoneware, House Drains, Sewer Pipes, and Fittings, Paving Bricks, Tiles, Fire Bricks and Fire Clay.

The Green Island Brand has become the standard Portland Cement of Asia, owing to its purity, uniformity and tests.

Used by H.B.M.'s Government in Hongkong, United States Government in the Philippines for all important Public Works.

Also by H.B.M.'s Government in Singapore and Federated Malay States for Government Buildings, Railways and Harbour Works.

Established 1883 Telegraphic Address "ROPEWORK," HONGKONG

THE HONGKONG ROPE MANUFACTURING Co., Ltd.

Manufacturers of Pure Manila Hemp Rope

Rope supplied to the British Navy on the China Station and to all Mail and regular Steamship Lines.

Ropes, Cables and Hawsers ½-in. to 15-in. Circumference. Driving Ropes for Mills; Bull Ropes and Drilling Cables for Oil Wells a Specialty.

SHEWAN, TOMES & CO.

General Managers

St. George's Building HONGKONG.

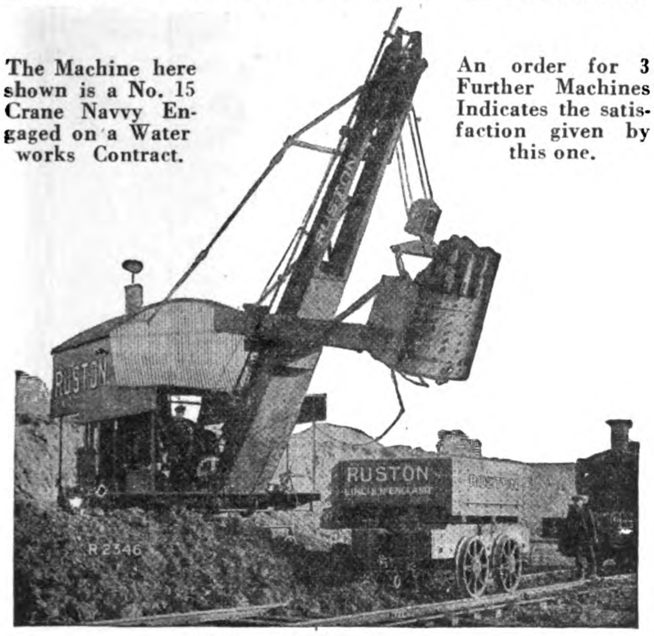
ECONOMICAL EXCAVATIONS

RUSTON EXCAVATORS—Crane Navvies Shovels, and Draglines have proved their efficiency on all classes of excavations in all parts of the world.

Wide Range of Machines available on Rail Wheels, Road Wheels or Caterpillar Tracks.

The Machine here shown is a No. 15 Crane Navvy Engaged on a Water works Contract.

An order for 3 Further Machines Indicates the satisfaction given by this one.



Full particulars from:—

RUSTON & HORNSBY LTD., LINCOLN, England.

OR

MARTIN & CO., CALCUTTA.
ARNHOLD BROTHERS & CO., LTD., SHANGHAI.
UNITED ENGINEERS LTD., SINGAPORE.

The JANNEY-PENN Coupler

THE latest development of the Janney type of M. C. B. Coupling originally introduced and promoted by this company. This coupler has all the simplicity of the early type of the Janney coupler, and also has the up-to-date features of a "Lock-to-the-Lock," "Lock-Set," and a "Knuckle-Opener," and complies fully with all the requirements and recommendations of the M. C. B. Association of the U. S. A.

This coupler has the desirable feature of easy accessibility of parts, thus facilitating the making of repairs.

Furnished with various designs of rear end to suit different types of Draft Rigging.

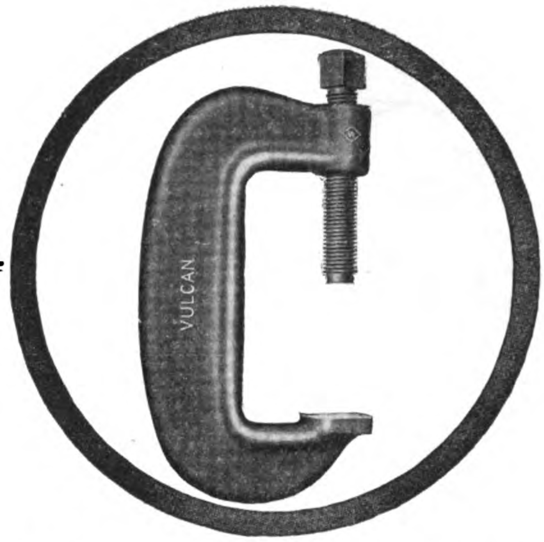
Manufactured exclusively by

THE McCONWAY & TORLEY CO.

Pittsburgh, Pa., U. S. A.

Cable Address—Torley, Pittsburgh

China Agents: **The Fearon, Daniel Co., Tientsin, Peking, Hankow and Shanghai, China**



A Sure Foundation

CLAMPS and Lathe Dogs are essential tools in all machine shops. Since they are indispensable to what may be termed basic operations, they form an important part of the foundation on which is built economical production.

Build your foundation strong and sure—use the dependable, sturdy strength of Williams' Superior Drop-Forged Clamps and Lathe Dogs. They'll never fail you and will last a life time. All are acknowledged standard everywhere.

CLAMPS—11 patterns, in a wide range of sizes for every clamping purpose.

SAFETY LATHE DOGS—Bent or Straight Tail, 1 or 2 screws, 16 sizes. Literature on request.

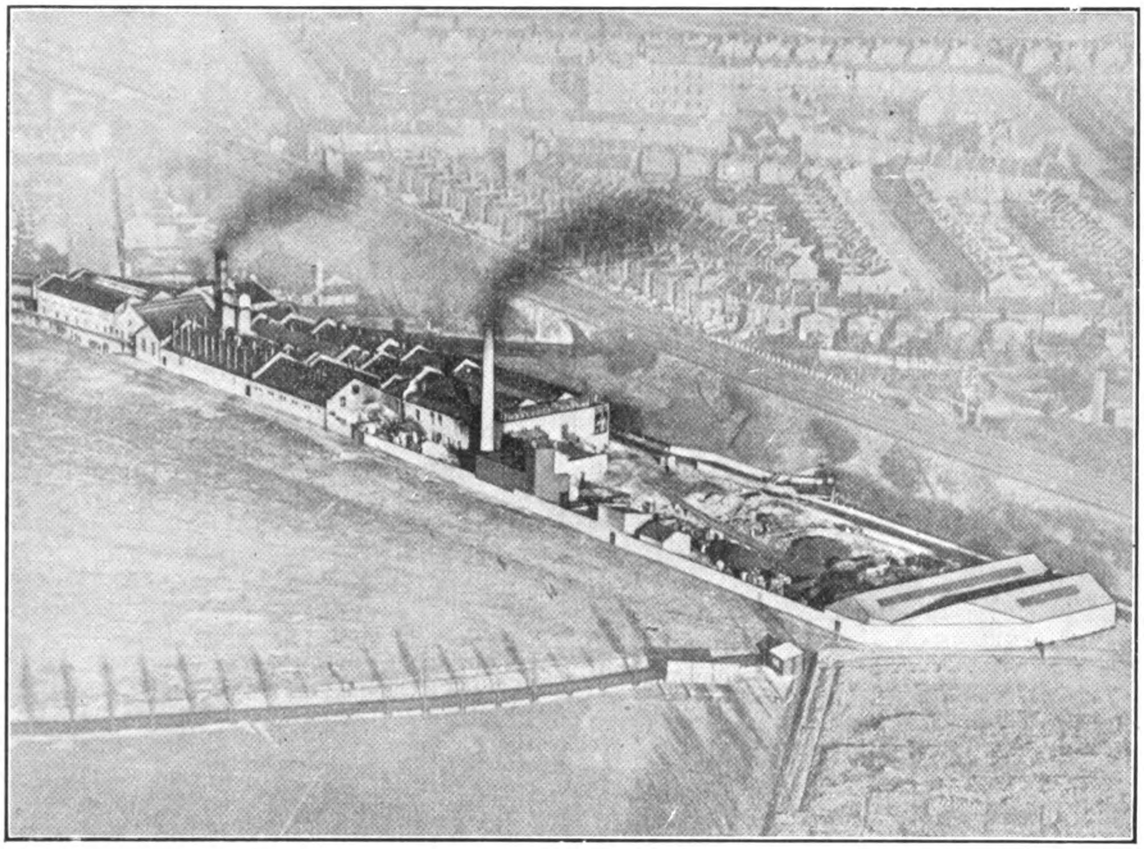
J. H. WILLIAMS & CO.

"The Wrench People"

London Representative:
Benjamin Whittaker, Ltd.,
Dept. K.
56 Ludgate Hill, E.C. 4.

Export Office:
124 State Street,
New York, U.S.A.

General Offices:
124 Richards Street,
Brooklyn, N.Y., U.S.A.



FAMOUS FACTORIES — THE "IRONCLAD" WORKS

CURTIS'S & HARVEY LTD.

The numerous activities in which Nobel Industries Ltd. are directly interested include Incandescent Gas Mantles, a trade which prior to the war was largely in the hands of Germany. The above illustration depicts one of the factories where British Gas Mantles are made, which, built on modern lines and fitted with the most up-to-date machinery, was purchased in 1916 by Curtis's & Harvey Ltd., in order to cope with the ever increasing demand for their Gas Mantles, "Ironclad" in particular.

Curtis's & Harvey's Gas Mantle business is incorporated in Lighting Trades Ltd., which in its turn is associated with the original parent company, Nobel Industries Ltd.

An annual average output of 50,000,000 Incandescent Mantles makes Lighting Trades Ltd. the largest manufacturers of these articles in the world, and the Company is in an exceptionally favourable position in that they are practically independent of outside sources for their raw materials. They spin their own Ramie Yarn, they extract Thorium from Monazite Sand, have substantial interests in companies manufacturing Magnesia Rings and make and print all the boxes and tubes that they require.

ENQUIRIES for the products of Lighting Trades Ltd., such as ordinary Mantles for Gas, Oil and Acetylene Systems and soft and collodionised Ramie, Silk and Cotton Mantles for High and Low Pressure Burners, Lamps, Lanterns, etc., can be addressed direct to them at their offices, 103, Cannon Street, or to:

NOBEL

NOBEL INDUSTRIES LIMITED

Head Office:

NOBEL HOUSE, LONDON, S.W. 1.

NOBEL

Write to the Advertising Department, Nobel House, for illustrated booklet "The Products of Nobel Industries, Ltd." mentioning this Journal.

UNITED STATES STEEL PRODUCTS COMPANY

30 Church St., New York, U.S.A.

Sole Exporters of the Products of

Carnegie Steel Company
Illinois Steel Company
American Steel & Wire Company
American Sheet & Tin Plate Company
The Lorain Steel Company
American Bridge Company
National Tube Company
Tennessee Coal, Iron & Railroad Company
Minnesota Steel Company
Canadian Steel Corporation
Chickasaw Shipbuilding and Car Company

BRANCH OFFICES and REPRESENTATIVES IN

Antwerp, Belgium
Birmingham, England
Bombay, India
Brussels, Belgium
Buenos Aires, Argentine Republic
Calcutta, India
Cape Town, South Africa
Christiania, Norway
Concepcion, Chile
Glasgow, Scotland
Havana, Cuba
Johannesburg, South Africa
Lima, Peru
Los Angeles, California
London, England
Mexico City, Mexico
Montreal, Canada
New Glasgow, Canada
New Orleans, La
Paris, France
Peking, China
Portland, Oregon
Rio de Janeiro, Brazil
Rome, Italy
Rotterdam, Holland
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Seattle, Washington
Soerabaya, Java
Sydney, New South Wales
Tokio, Japan
Toronto, Canada
Valparaiso, Chile
Vancouver, Canada
Winnipeg, Canada

WAREHOUSES AT

Antwerp, Belgium
Bombay, India
Buenos Aires, Argentine Republic
Calcutta, India
Callao, Peru
Cape Town, South Africa
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Talcahuano, Chile
Valparaiso, Chile

We give prompt attention to inquiries for all class of our Steel Products, including the following:—

AERIAL TRAMWAYS—Reversible, specially designed
ALLOY STEEL
ALLOY STEEL SHEETS
AMMONIA CYLINDERS
ANGLES
ARMATUR SHEETS
AXLES—Locomotive, Railroad and Tramway Cars
BAMBOO STEEL
BARBED WIRE
BARS—Steel, Concrete Reinforcement
BILLETS
BLACKS SHEETS
BLOOMS
BOILER TUBES, LAPWELDED, SEAMLESS
BOLTS AND NUTS
BRIDGES—Railway, Highway, specially designed
BUILDINGS—Steel Warehouses, Structural Steel for Buildings
CABLES—Steel Hoisting and Hauling Cables
CARS—Steam Railway, Mine and Industrial Railway Cars
CAR ANGLES
CAR WHEELS
CIRCULAR STEEL POLES
COLD ROLLED FLAT WIRE
COPPER RAIL BONDS
COPPER STEEL SHEETS
DERRICKS
DRILLING MACHINES
DRILLING RIGS FOR OIL WELLS
DUQUESNE RAIL JOINTS
ELECTRICAL SHEETS
ELECTRICAL WIRES AND CABLES
FABRICATED STRUCTURAL MATERIAL FOR BRIDGES, TURNTABLES, STEEL BUILDINGS, ETC.
FENCING MATERIALS—Wire Fencing, Steel Posts
FORGINGS
FROGS AND SWITCHES—Steam and Electric Railways
HOOPS AND BANDS
MACHINE FORGINGS
MINE TIMBERS
NAILS AND SPIKES
NAIL WIRE
PIG IRON
PILING—Steel Sheet
PIPE—Black and Galvanized Wrought, for Steam, Gas and Water: American or English Lapwelded Boiler Tubes. Matheson Lead Joint Pipe. Seamless Steel Tubing
PLATES—Boiler, Tank, Ship, Flange and Fire Box Steel
POLES—Steel Tubular
RAILS—Light and Heavy Rails for Railways, Tramways, Mine and Industrial Railways. Special Track Work
REINFORCEMENT FOR CONCRETE—Triangle Wire Mesh
RIVETS
ROPE—Wire for Mine Hoists, Derricks, Cranes, etc.
SCREW SPIKES
SCREW STOCK—Cold Drawn
SHAFTING
SHAPES—Standard Structural
SHEET BARS
SHEETS—"Apollo" Brand, Plain, Galvanized, Corrugated, Black
SKELP
SLABS
SPIKES—Railway Track Spikes
SLEEPERS—Steel
SPRING STEEL
STEAM PIPE AND TUBES
STOVE PIPE SKEEBS
SWITCHS—Switch Stands
TANK PLATES
TERNE PLATES
TIN MILL PRODUCTS
TIN PLATE—"Coke," "Charcoal" and "Terne"
TOOL STEEL
TOWERS—Steel
TRIANGLE MESH CONCRETE REINFORCEMENT
TUBES—Gas, Water, Steam
TURNTABLES FOR LIGHT AND HEAVY RAILWAY SERVICE
UPHOLSTERY SPRINGS
WASHERS
WEATHERPROOF INSULATED TELEPHONE AND SIGNAL WIRE
WHEELS—Solid Wrought Steel for Steam, Electric, Mine and Industrial Railways
WIRE PRODUCTS—Plain, Galvanized, Bright Hard, Bright Soft, Baling and Fencing. All Classes of Coated and Uncoated for Manufacturing Purposes

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE: Union Building—The Bund and Canton Road
PEKING OFFICE: No. 22 Wu Liang Ta Jen Hutung
TOKYO OFFICE: No. 15 Nakadori, Marunouchi

OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President:
Baron K. Okura

BRANCHES at Hakodate, Yokosuka, Yokohama, Osaka, Kobe, Maizuru, Kure, Moji, Saseho, Keelung, Taihoku, Seoul, Antung, Penhsihu, Mukden, Tientsin, Peking, Hankow, Changsha, Kiukiang, Tsingtau, Hongkong, Vladivostok, Sydney, San Francisco, New York, London.

Head Office:
Ginza, Tokio

GENERAL IMPORTERS AND EXPORTERS

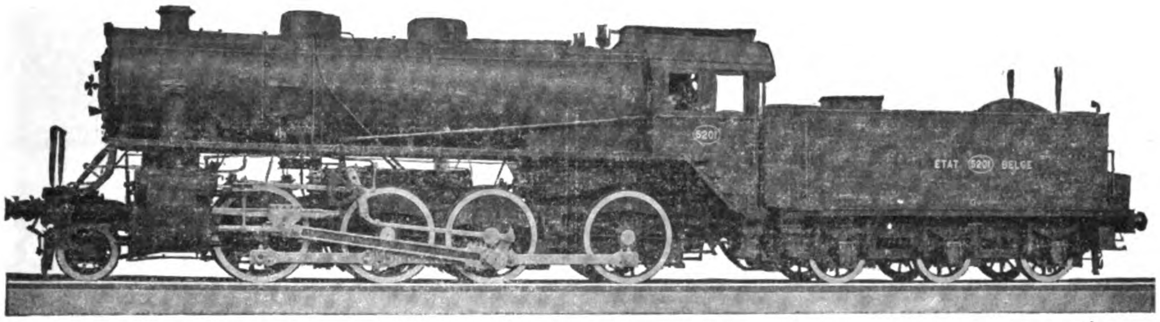
Rails, Bridges, Locomotives and other Railway Supplies
Electric Plants, Electrical Supplies
Sugar Plants, Spinning Machinery, Machine Tools
Factory Equipments, and all kinds of Machines
Automobiles, Guns and Explosives
Structural Materials, Steel Materials, Metals
Mineral Products, Chinese and Japanese Produce, Silk
Cotton, Wool, and their Manufactures
Fertilizers, Chemicals, Vegetable Oils and Wax, Dye Stuffs
Food Stuffs, Hides and Fur, Skins, Pen-hsi-fu Smokeless Coal and Pig Iron, etc.

BUILDING AND CIVIL ENGINEERING CONTRACTORS,
INSURANCE AGENTS

Yih Chong Wharf (Okura)

POOTUNG, SHANGHAI

AN UNUSUAL TRIBUTE



BUILT FOR THE BELGIAN GOVERNMENT

Total Weight of Engine, 188,000 pounds; Weight on Driving Wheels, 167,000 pounds; Diameter of Driving Wheels, 59⅞ inches; Boiler Pressure, 200 pounds; Cylinders, 24 × 28 inches; Maximum Tractive Power, 35,000 pounds.

An unusual tribute to the locomotives supplied to the Belgian Government by the United States builders recently appeared in the Belgian official publication—"Chronique des Travaux Publics."

The following are extracts from this article :—

"The American locomotives measure up to the most optimistic expectations, inasmuch as we are using them on the Luxembourg line, the hardest division of our railways—and all are giving the best of service.

"The good quality of the American engine is proved by the significant fact that they are used in passenger service.

"The most important part of the locomotive—the boiler—is perfect.

"In a word, the American locomotives are giving entire satisfaction. They conform to the technical requirements imposed and they have to-day already given considerable service."

AMERICAN LOCOMOTIVE SALES CORPORATION

Export Sales Agents for

AMERICAN LOCOMOTIVE COMPANY

AND

MONTREAL LOCOMOTIVE WORKS, LIMITED

30 CHURCH STREET, NEW YORK, U. S. A.

CABLE ADDRESS: "LOCOMOTIVE," NEW YORK

RESIDENT TECHNICAL REPRESENTATIVE

CHINA: PEKING—F. M. Titus, 24 Shih Chia Hutung

MITSUI BUSSAN KAISHA

LIMITED

Cable Address: "MITSUI"

Capital: Yen 100,000,000
Reserve: „ 30,000,000

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

IMPORTERS AND EXPORTERS

SHIPOWNERS AND SHIPBUILDERS

***Head Office*: TOKYO, JAPAN**

***Branches*:**

HOME—Yokohama, Nagoya, Osaka, Kobe, Otaru, Muroran, Hakodate, Niigata, Moji, Wakamatsu, Kuchinotsu, Nagasaki, Karatsu, Miike, Taipeh, Keelung, Tainan, Takow, etc., etc.

ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soerabaya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc., etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

---

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc., etc.

IMPORT.

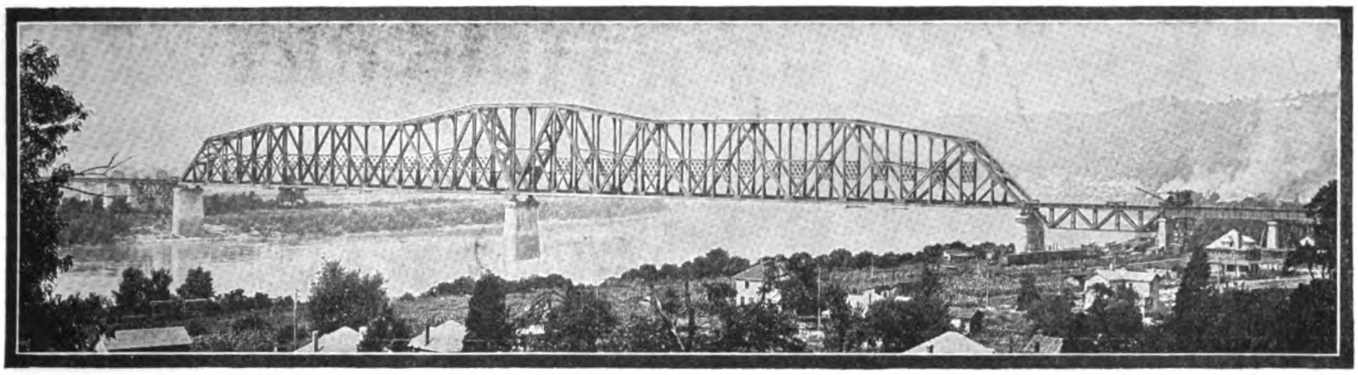
Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

ENGINEERING DEPARTMENT

Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Export Co.
Manning Maxwell & Moore, Inc.
Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc. etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



Sciotoville Bridge at Sciotoville, Ohio, U.S.A., constructed by McClintic-Marshall Company.

We Design,
Manufacture and Erect
Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity, 400,000 Tons

The past accomplishments of the McClintic-Marshall Products Company create a feeling of confidence among those who contemplate steel construction of any kind.

This organization has completed major structures in every field of industry throughout the world. It undertakes its problems with confidence based upon an intimate knowledge of engineering requirements.

The McClintic-Marshall Products Company maintains five complete manufacturing plants and is prepared to meet specifications and insure prompt delivery of material.

Write for Free Booklet 402

McClintic-Marshall Products Company

FACTORIES: PITTSBURGH, U. S. A.
Foreign Contract Dept: 50 Church Street, NEW YORK, U. S. A.
Cable Address: "Macmarsh," NEW YORK.

YOKOHAMA: H. E. Root, 50a Yamashita-cho

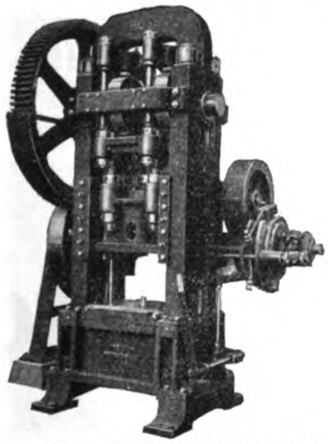
LONDON: George A. Smith, St. Stephen's House, Westminister, London, S.W.1.
PARIS: Produits Métallurgiques McClintic-Marshall, 8 Rue Edouard VII
MADRID: Hispano-American Corporation.
HAVANA: San Ignacio y Obrapia
Codes: Bentley's, General, Western Union Five Letter, Lieber Five Letter

McClintic-Marshall

Steel Construction

MACHINERY for Manufacturing Tin Cans—Tin Ware—Metal Packages Cutlery—Hardware—Aluminum Ware and Enamel Ware—Electrical Equipment. Also Horseshoe—Minting and Drop Forging Machinery

1857 BLISS 1922



"BLISS" Straight-side Double Action Cam Drawing Press, built in 20 sizes, weighing from 750 to 32,000 lbs. Used in cutting and drawing shells in tin, brass, zinc, copper, aluminium and steel

"BLISS" Presses are found working all day, every day, in all lines of manufacture where sheet metal work is used. They are adapted to the use of manufacturers of tin cans and containers of every description, cigarette boxes, brass goods, electrical goods, tinware, agricultural implements, kitchen boilers, telephone stampings, hardware, kitchen utensils, lamps, lanterns, toys, typewriters, adding machines, automobile and motor cycle parts, steel railroad cars and special lines too numerous to mention.

There is no article formed, pressed, stamped or drawn from sheet metal but that can be made economically on "BLISS" machinery. For 65 years we have specialized in building sheet metal working machinery and offer you our knowledge and experience in solving your problems.

Send us samples or drawings of the articles you wish to produce, stating daily production desired of each piece. We will advise you the machinery that best meets your needs.

"BLISS" on your machinery is more than a name; it's a guarantee.

E. W. BLISS CO. MAIN OFFICE AND WORKS **BROOKLYN, N. Y., U. S. A.**

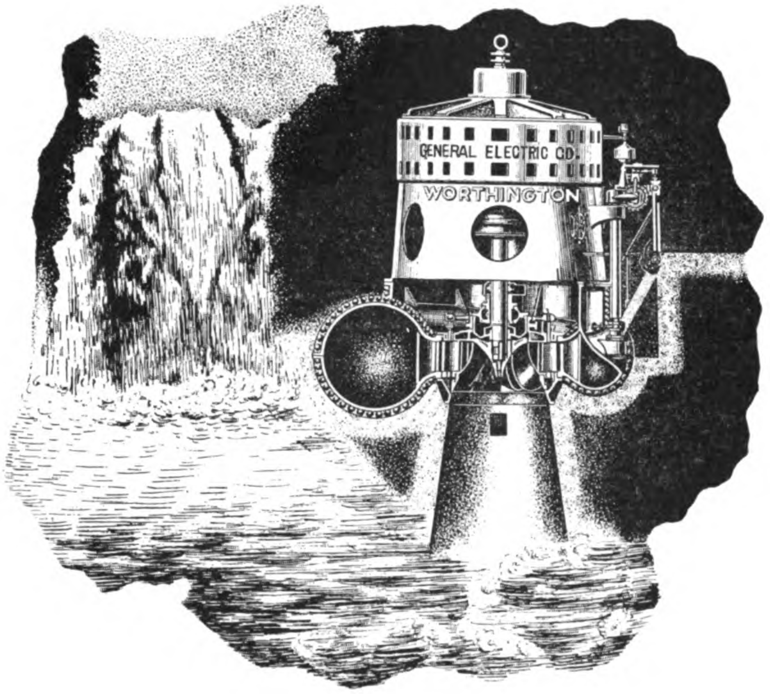
American Factories: BROOKLYN, N.Y. HASTINGS, MICH. CLEVELAND, OHIO. SALEM, OHIO.

FOREIGN SALES OFFICES AND FACTORIES:
ENGLAND, Pocock St., Blackfriars Rd., S. E., London ITALY, 345 Via Nizza, Turin FRANCE, 54 Blvd. Victor-Hugo St. Ouen, Paris

FOREIGN REPRESENTATIVES:

INDIA	CHINA	JAPAN
Alkin and Duff Eng. Co.,	Allied Machinery Co. of America,	Horne Co., Ltd.
Clive Building, Calcutta	Shanghai, Tientsin, Dairen, Manchuria	Tokyo, Osaka

No. 243



A Gift from Nature

Every hour there is passing down the streams, rivers and waterfalls in China horse power in enormous quantity which is simply wasted as nature's overflow. Electrical engineers of to-day, however, have perfected ways of transforming water energy into useful electrical energy for use in lighting cities and turning the wheels of industry in mills and factories.

This almost inexhaustible supply from nature saves coal and complicated generating machinery. Combined with this are the advantages of high efficiency and simple control which make hydro-electric plants stand well to the front as profitable enterprises.

Although still in its infancy the hydro-electric development of China is being foreseen by more and more investors every day. Is there a swift stream or waterfall near you ? Why let this free gift fall into others' hands ? If you will communicate with us, we shall be glad to place our knowledge and experience at your service.

Andersen, Meyer & Co., Ltd.

Sole Agents for China

Address inquiries to : SHANGHAI, MUKDEN, TIENTSIN,

PEKING, TSINAN, HANKOW, CANTON or HONGKONG

STANDARD OIL COMPANY OF NEW YORK

26 Broadway **New York**

SO NY
SOCONY
TRADE MARK
美孚行
STANDARD OIL CO. OF NEW YORK

The Mark of Quality

SOCONY PRODUCTS

Illuminating Oils **Lubricating Oils**

Gasoline and Motor Spirits

Lamps, Stoves and Heaters

Road Oils and Material for Road Building

Paraffine Wax and Candles

BRANCH OFFICES IN PRINCIPAL CITIES OF

Japan	Siam	India
China	Philippine Islands	South Africa
Indo-China	Straits Settlements	The Levant
	Netherlands India	

THE

HONGKONG & WHAMPOA DOCK CO.

LIMITED,

HONGKONG

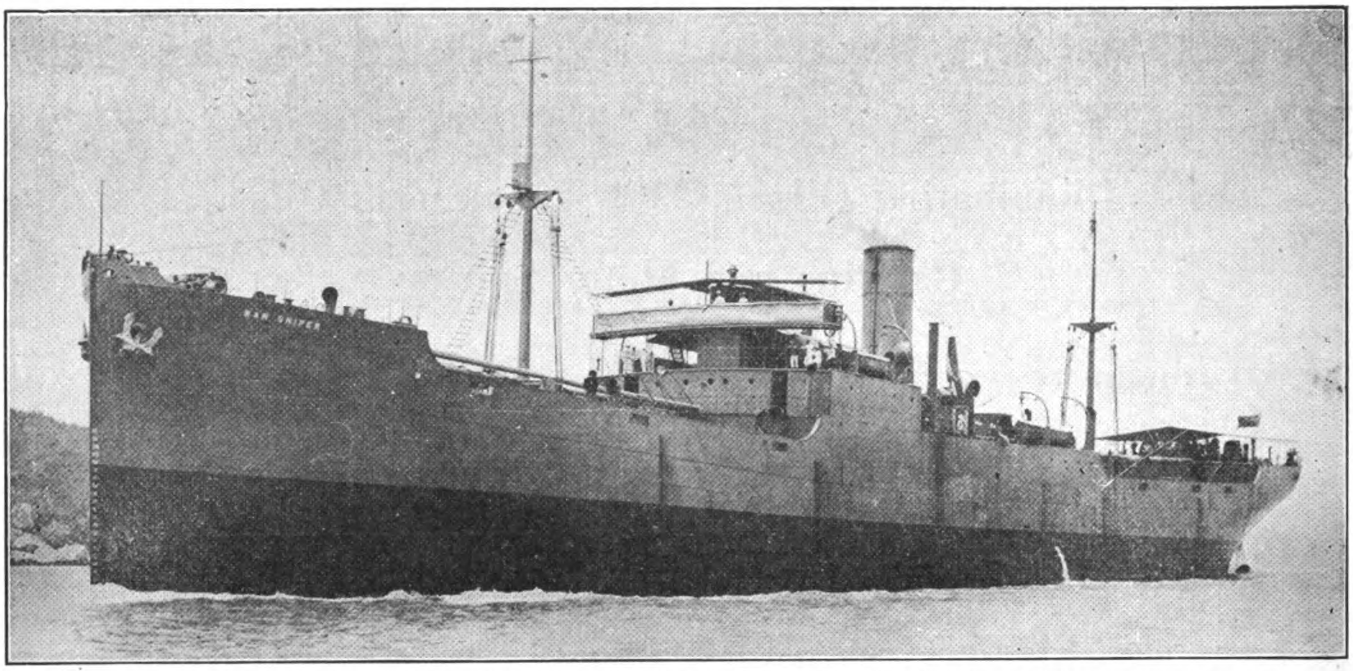
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

With Steel Plate or Cast Iron Frames

Agents for China:—

The Anglo-Chinese Engineers' Association, Ltd.

in Association with Reiss & Co.

Address:—

Ice House St., Hongkong

7 Hankow Rd., Shanghai

Liddell Buildings, Yaku Road, Tientsin.

52 Dar Farng Chia Hutung, Peking.

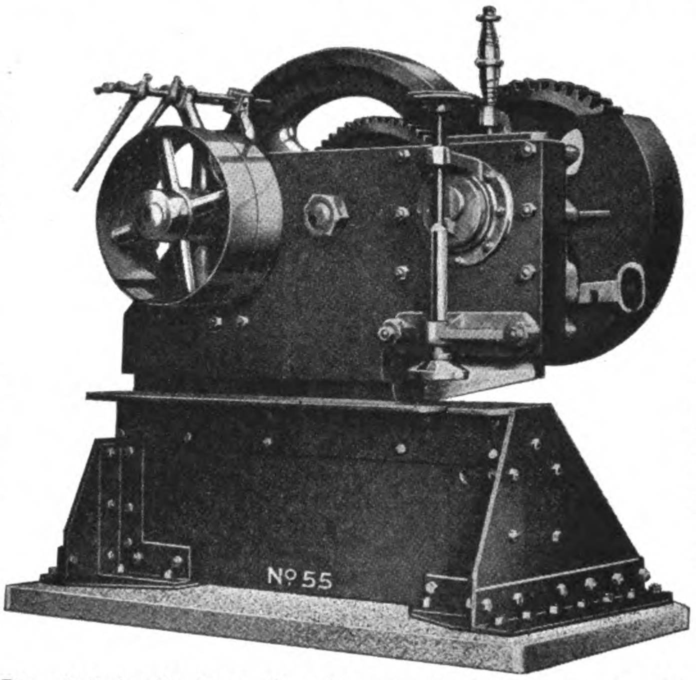


Plate Splitting Machine. For plates of unlimited length and width.

Punching and Shearing Machines.

Plate Bending Machines.

Plate Straightening Machines.

Plate Edge Planing Machines.

Plate Shearing Machines.

Steam Bending and Straightening Machines.

Bar Cropping Machines.

Multiple Punching Machines.

etc. etc.

CRAIG & DONALD LIMITED

Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LTD.

PATENT

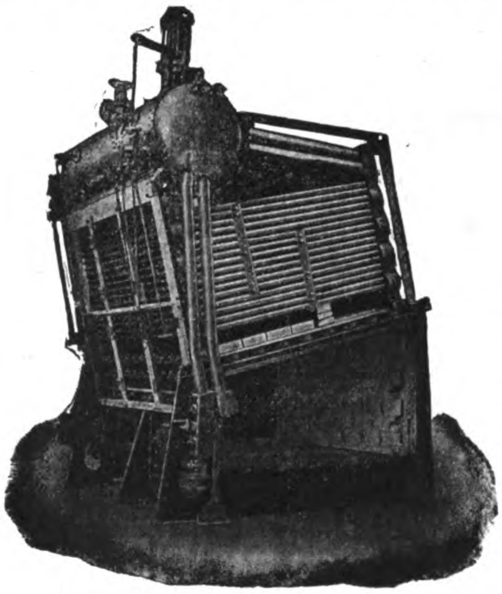
WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES, AND FOR BURNING ANY KIND OF FUEL

13,400,000 H.P. Land type For Stationary Purposes—**6,400,000 H.P.** Marine-type Afloat

MANUFACTURERS OF

SUPERHEATERS
FEED-WATER HEATERS
ECONOMISERS
STEAM PIPING
STRUCTURAL STEEL WORK
MECHANICAL STOKERS
STEEL CHIMNEYS
WATER SOFTENERS AND PURIFIERS
COAL-CONVEYING MACHINERY
SUCTION ASH PLANTS
ELECTRIC CRANES
GENERAL BOILER HOUSE ACCESSORIES



Babcock & Wilcox Marine Boiler

THE

BABCOCK & WILCOX

PATENT

MARINE-TYPE

BOILER

as used in Battleships and Cruisers of the British, American, Danish, Italian, Spanish, Brazilian, and Argentine Navies, and in Vessels of all Classes of the Mercantile Marine.

BABCOCK & WILCOX also Supply as Joint Manufacturers and General Licensees with J. SAMUEL WHITE & CO., LTD. the WHITE-FORSTER Boiler for Destroyers, Torpedo Boats, Pinnaces, etc.

HEAD OFFICE FOR CHINA: 1 THE BUND, SHANGHAI

„ „ „ JAPAN: I. I-CHOME, YURAKU-CHO, KOJIMACHIKU, TOKYO.

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

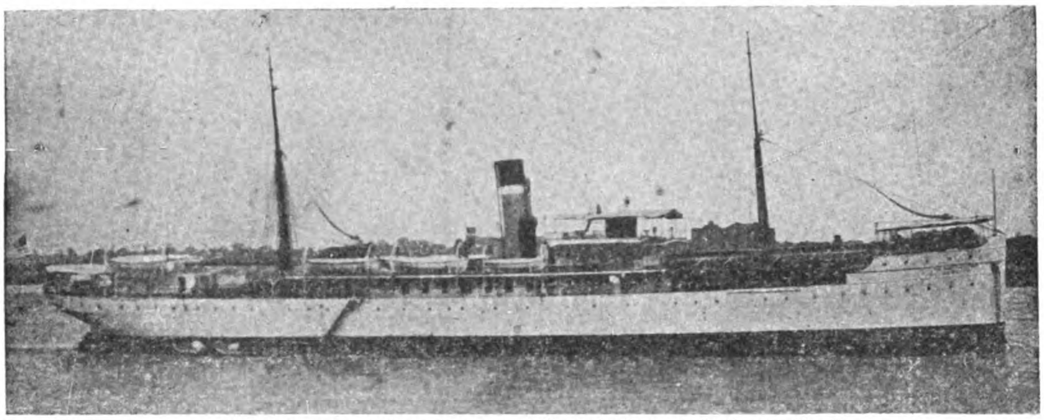
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″

Cable Address "FARNHAM" Codes Used, A.B.C. 4th, 5th & 6th Editions A-1, Watkin's, Scott's, Western Union, Bentley's and Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are four in number, ranging in length from 355 feet to 700 feet on the Blocks, and breadth of entrance from 53 feet to 80 feet, with a depth of water on the sill of from 16 feet to 27 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs ; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Low Pressure Hot Water and Steam Heating Installations

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR
"F.B." INTERNATIONAL CODE

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

ENQUIRIES SOLICITED

Light railway lines are laid throughout workshops and yards.

A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

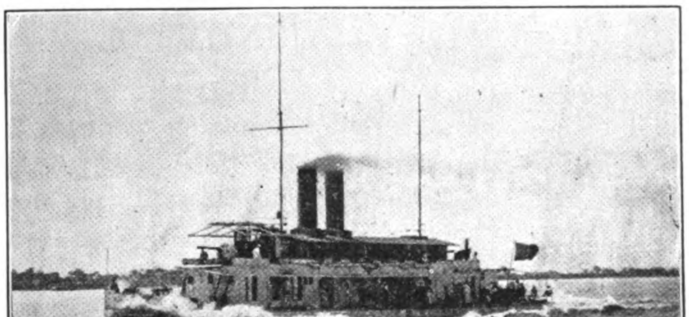
Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

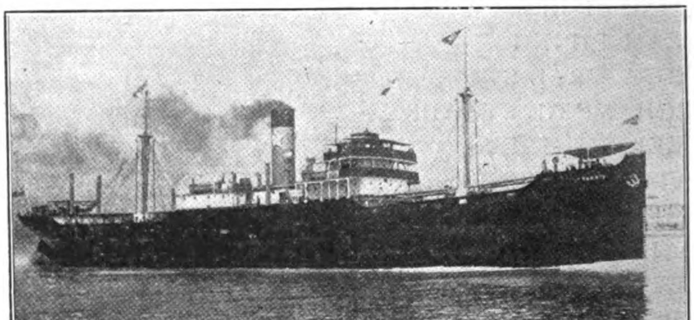
Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

PARTICULARS OF DRY DOCKS

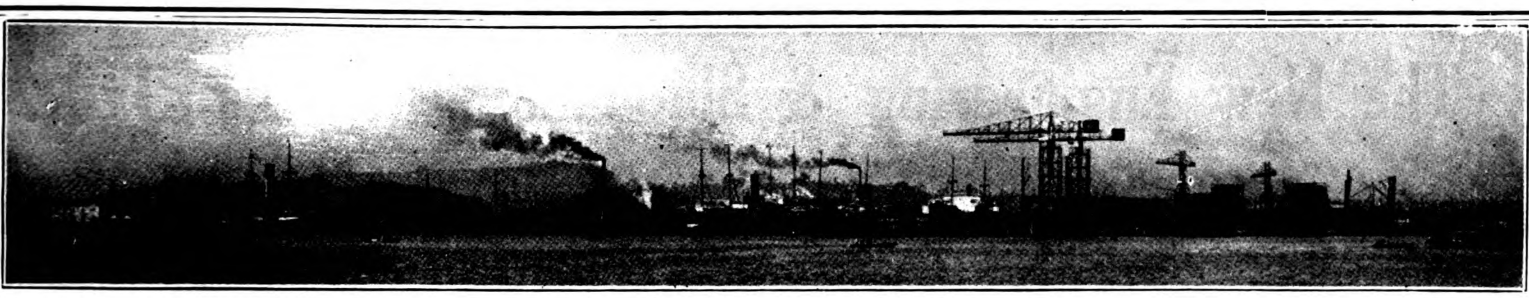
Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock ...	700 feet	80 feet	27 feet
International Dock ...	528 ,,	77 ,,	23 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,



H.I.M.S. "ERMANNO CARLOTTO"
Designed and Constructed for the Royal Italian Navy
Length 160 feet. Twin Screw Engines.
Draft 2 feet 10 inches with full equipment and 30 tons of coal on board. Mean continuous speed 14 knots per hour.



s.s. "YANNIS" ex "WAR TIARA"
Sister Ship s.s. "PANAGIS" ex "WAR DIADEM"
Sister Ship s.s. "MELLON" ex "WAR REGALIA"
Built for the British Government.



View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

Head Office: Nagasumi-cho :: ***Warehouse Office:*** Midori-cho

Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
"DOCK"
Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:	
No. 1	625′ × 80′ × 28′
No. 2	380′ × 50′ × 26′
No. 3	480′ × 63′ × 21½′

SHIPBUILDING BERTHS:	
No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4, No. 5	680′ × 38′

WAREHOUSES:	TSUBO.
Iron Building	8,871.57
Concrete Building	1,636.99
Brick Building	2,011.72
Others	5,807.74

Directors: TOSHINOBU SUDA, Esq. *(Chairman)*, MANKICHI MIYANAGA, Esq. *(Managing Business Dept.)*,
TAMATARO TOJO, Esq. *(Managing Shop Dept.)*

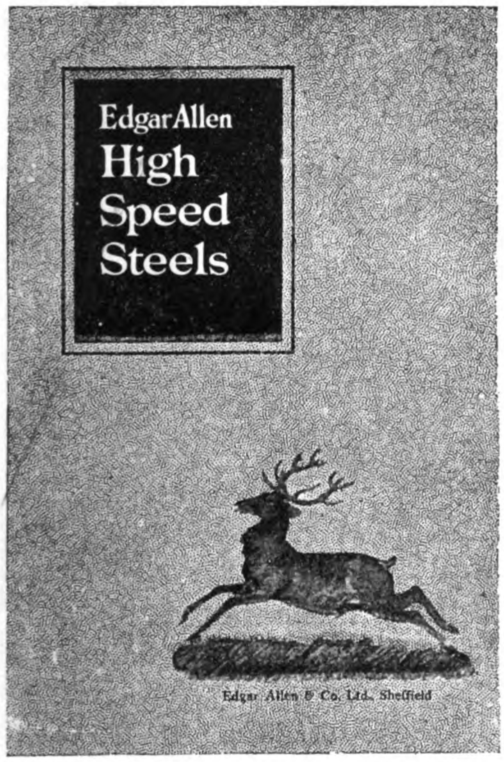
Agencies: NIPPON YUSEN KAISHA, London Branch. NIPPON YUSEN KAISHA, New York Branch.

All situated in Yokohama Harbour, the First Port at which Trans-Pacific Steamships arrive, and the Last Port from which they depart.

Complete Facilities for every Work and Fully Equipped up to date for

All Repairing Work. All Engine Work. All New Ship Work. All Boiler Work.

STAG BRAND



This Book Helps!

How to order High Speed Steels, how to heat-treat them, the speeds and feeds for turning different classes of work, and many other matters of importance to steel users, are dealt with in the new booklet issued by Edgar Allen & Co., Ltd. Every tool-user and/or tool-buyer should have it in his possession. Reference is also made to ready-hardened lengths, toolholder-bits, discs for milling cutters, and so on.

Edgar Allen

"High Speed Steel" will be sent on request, providing the information indicated on the Request Form is given by the applicant.

Edgar Allen & Co. Ltd.
Imperial Steel Works
Sheffield

Agents:
Messrs. Jardine, Matheson & Co., Ltd.,
Engineering Department,
8a Yuen-Ming-Yuen Road, Shanghai, China
Messrs. Edgar Allen & Co., Ltd.,
2 Mitsu Bishi Buildings,
1 Yaesu-Cho, Kojimachi-ku. Tokyo, Japan

Pin the Request Form to your letter, and a copy will be sent by return.

To Edgar Allen & Co., Limited
Imperial STEEL Works. Sheffield.
Please post "High Speed Steel" to
Name
Firm
Address
E.P.

The New Engineering & Shipbuilding Works, Ltd.

PROPRIETORS OF THE YANGTSZEPOO DOCK

SHANGHAI, CHINA.

CABLE ADDRESS, "SPEEDY"

Call Flag Inter "A"

DOCK PROPRIETORS AND SLIP OWNERS

YANGTSZEPOO DOCK

Length ....577″

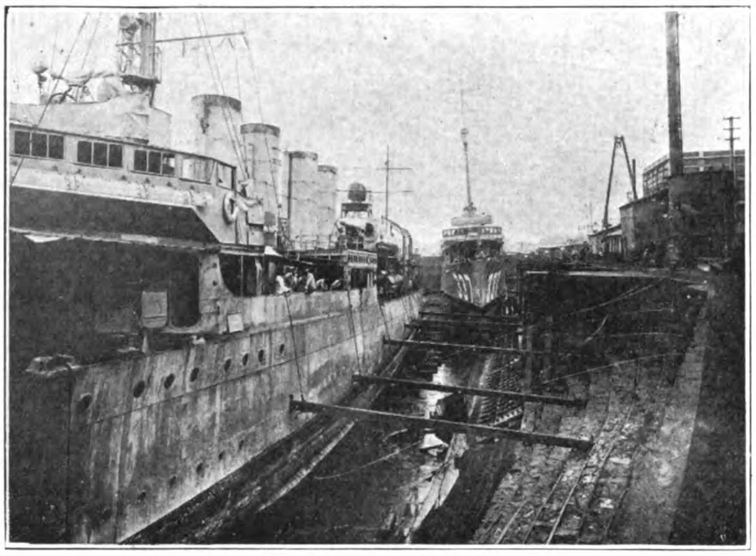
Entrance ....70″

Width of Sill ....60″

Depth on Sill ....20″

PATENT SLIPS

For Vessels up to 200 feet long

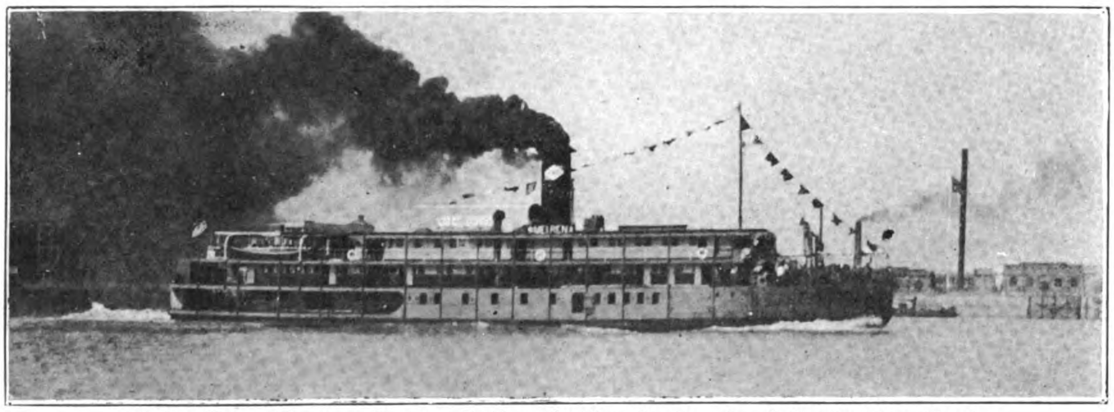


U. S. Destroyer in Dock

Vessels docked at Short Notice. All Repairs Carried out Efficiently and Expeditiously at Moderate Rates under European Supervision.

SHIPBUILDERS, SHIP-REPAIRERS, BOILERMAKERS, ELECTRICIANS, BLACKSMITHS, FOUNDERS, WELDERS, SALVAGE EXPERTS, MANUFACTURERS OF THE "SPEEDY" MOTOR

Makers under Royalty of Sturrock's Patent Furnace Bridges.



200-feet Upper Yangtsze Steamer Built at the New Engineering & Shipbuilding Works.

ESTIMATES, DESIGNS AND SPECIFICATIONS PREPARED FREE OF COST

for the construction of all classes of Steamers, Tow-boats, Launches, Lighters and Pontoons, Engines, Boilers and Condensing Plants, Pumps and Hoisting Engines, Structural Steel and Steel Window Casements, Power Plants for Mills and Filatures, Electrical Power and Light Installations, Water Tanks and Towers.

SOLE REPRESENTATIVES FOR

KITCHEN'S REVERSING RUDDERS

This Rudder Greatly Improves Engine Efficiency and Economy, Reduces Wear and Tear to a Minimum, and Improves the Steering and Manœuvring Qualities of the Vessel at all Speeds.

Cable Address:
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO., LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

DAIREN, N.-C.,
Dockyard & Engineering
Works

HYOGO, KOBE
Steel Foundry, Bar Mill and
Railway Shops

FUKIAI, KOBE
Plate Mill

BUILDERS OF

BATTLESHIPS, CRUISERS, TORPEDO-BOATS, DESTROYERS, SUBMARINES

ALSO, BUILDERS OF

FIRST-CLASS HIGH-SPEED OCEAN STEAMERS OF THE LARGEST SIZE AND POWER

CREOSOTED TIES

OF

PHILIPPINE TIMBER

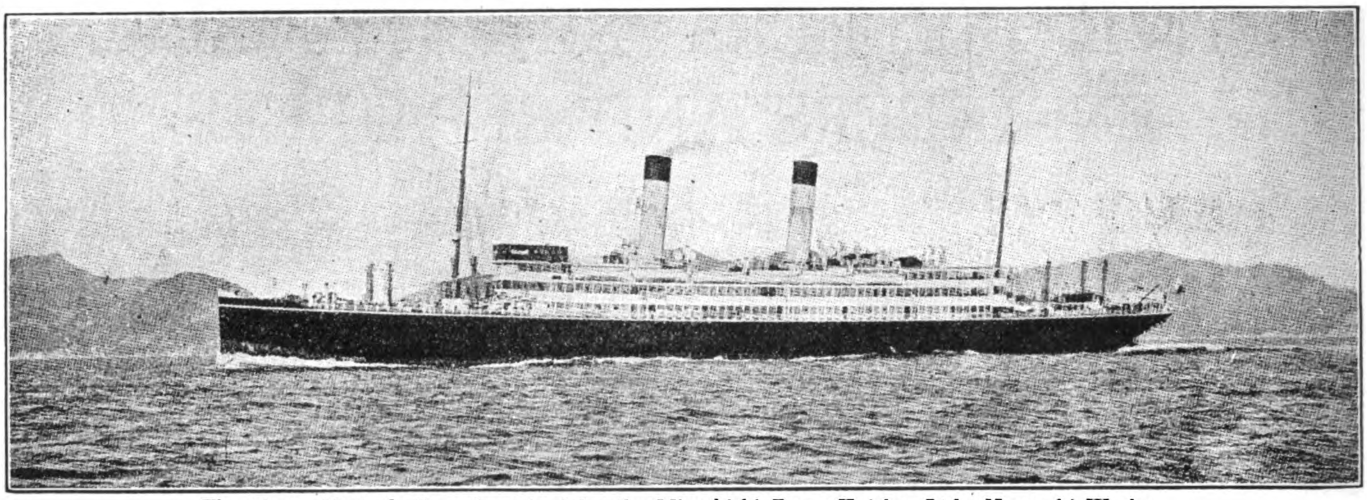
FOR

RAILROADS

ATLANTIC, GULF & PACIFIC CO. OF MANILA

77 Muelle de la Industria — Manila, P.I.

Cable Address: "DREDGING"



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

	DOCK No. 1	DOCK No. 2	DOCK No. 3
Extreme Length	523 Ft.	371 Ft.	728.9 Ft.
Length on Blocks	513 ,,	350 ,,	714 ,,
Width of Entrance on Top	89 ,,	66 ,,	99½ ,,
,, ,, ,, ,, Bottom	77 ,,	53 ,,	88½ ,,
Water on Blocks at Spring Tide	26½ ,,	24 ,,	34½ ,,

THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

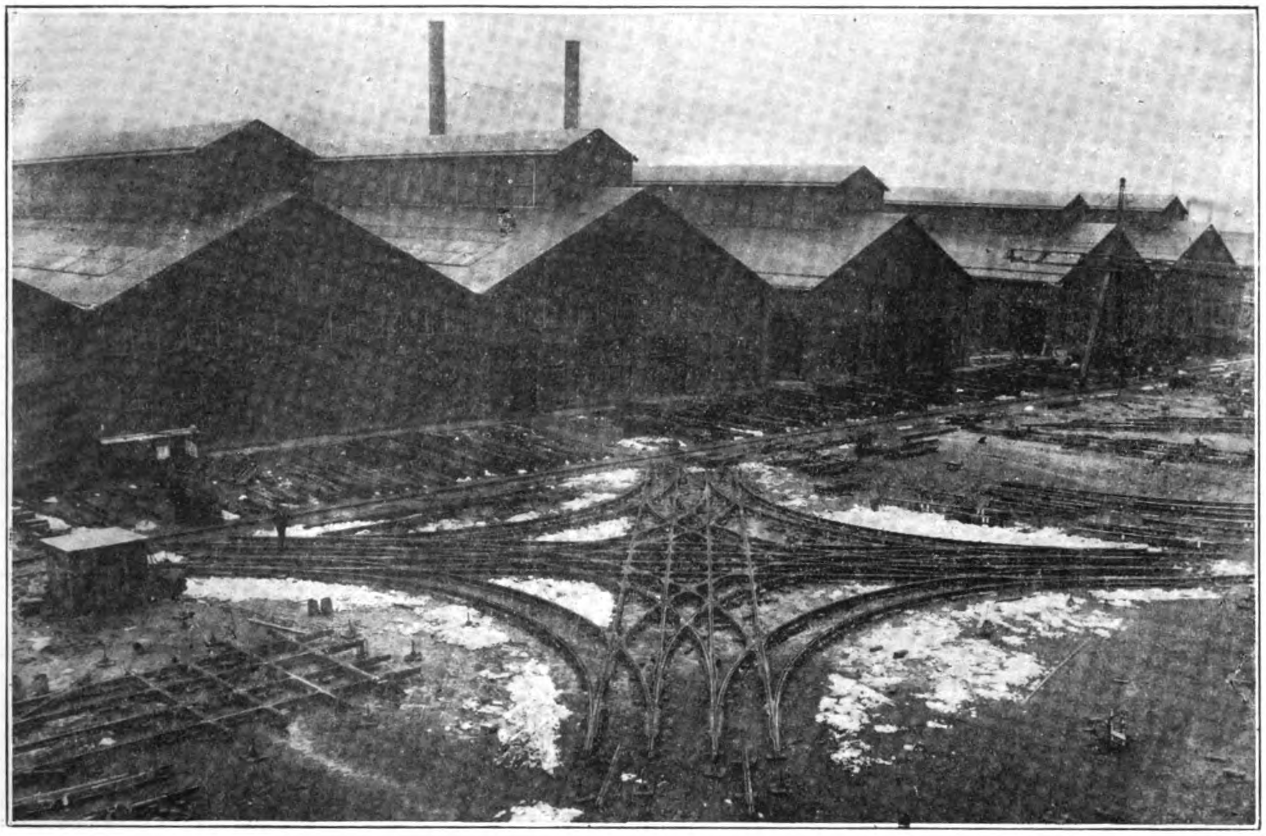
With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers

Also Electrical Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND

LORAIN

Special Track Work



The Standard Tramway Construction Throughout the World

UNITED STATES STEEL PRODUCTS CO.

UNION BUILDING
THE BUND AND CANTON ROAD
SHANGHAI
CHINA

15 NAKADORI MARUNOUCHI
TOKYO, JAPAN

22 WU LIANG TA JEN HUTUNG
PEKING, CHINA

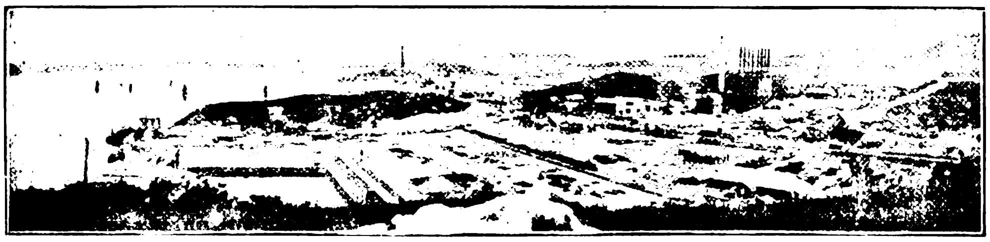
MITSUBISHI IRON AND STEEL CO., LTD.

(MITSUBISHI SEITETSU KAISHA, LTD.)

HEAD OFFICE: MARUNOUCHI, TOKYO

CAPITAL: (PAID UP) YEN 30,000,000

MILL (LLOYD'S APPROVED) KENJIHO, CHOSEN (KOREA)



PRODUCTS PIG IRON—Basic & Foundry 100,000 tons.

STEEL—High Tensile & Mild Steel 50,000 tons.

BY-PRODUCTS—Sulphate of Ammonia; Pitch; Naphthalene; Tar Oil (light, middle, heavy); Slag-Cement, Slag Wool.

Sales Agents: **The Mitsubishi Trading Company, Limited**

BRANCHES AND AGENCIES: Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

MITSUBISHI MARINE & FIRE INSURANCE Co., Ltd.

MITSUBISHI KAIJO KASAI HOKEN K. KAISHA

Head Office:

MARUNOUCHI, TOKYO

SUBSCRIBED CAPITAL - - Yen 5,000.000

PAID-UP CAPITAL - - - „ 1,250.000

Branches and Agencies:

LONDON, NEW YORK, OSAKA, KOBE, SHANGHAI, AND OTHER IMPORTANT CITIES AND PORTS IN THE WORLD

MITSUBISHI WAREHOUSE CO., LD.

(MITSUBISHI SOKO KAISHA, LTD.)

LANDING, SHIPPING AND FORWARDING AGENTS, STEVEDORES, CUSTOMS BROKERS & WAREHOUSEMEN

Head Office: MARUNOUCHI, TOKYO

Branches: TOKYO, YOKOHAMA, KOBE, OSAKA AND MOJI

General Managers of the

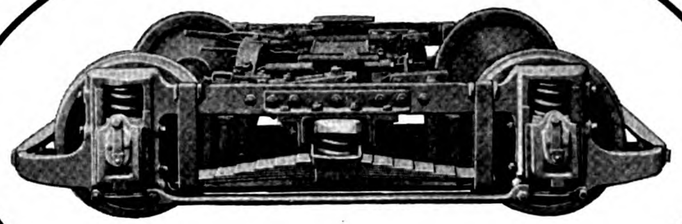
KYODO UNYU KAISHA

YOKOHAMA

3 KAIGAN-DORI, ITCHOME

YOKOHAMA

WITH TWO BRANCHES IN TOKYO



No. 77-E Truck
24 or 26-in. Wheels

For
LOW-LEVEL CARS

Far East Representative:
Andersen, Meyer & Co., Ltd., Shanghai
Pacific Commercial Co., Manila

BRILL

Main Office and Works
PHILADELPHIA, U.S.A.

THE J. G. BRILL COMPANY

Builders and Exporters

ELECTRIC TRAMCARS AND TRUCKS

Superior Barrel Shooks Bear This Trade Mark

CBCo

Made by CALIFORNIA BARREL CO., San Francisco

THE KOSTER COMPANY
12 NANKING ROAD, SHANGHAI
FOREIGN MANAGERS
CALIFORNIA BARREL CO.
OF SAN FRANCISCO

CABLES "KOSTER"
ALL CODES

TOSHIN SOKO

KABUSHIKI KAISHA

WAREHOUSING, FORWARDING AND EXPRESS CO.

WAREHOUSEMEN **LANDING AND SHIPPING**

STEVEDORES **CUSTOM BROKERS**

WAREHOUSING AREA - - - - - - - - - 77,000 tsubo (308,000 Sq. yds.)
VALUE OF GOODS IN WAREHOUSE (latest date) - - - Yen 100,000,000
CAPITAL (PAID UP) - Yen 5,000,000; RESERVE FUND - Yen 4,459,500

President: TOKUEMON MITSUI
Managing Directors: H. OKUMURA and R. KADONO
Directors: K. HAYASHI and K. FUKUI
Auditors: T. MITSUI and T. MAJIMA

HEAD OFFICE: No. 5 HONKAWAYA-CHO, NIHONBASHI-KU, TOKYO

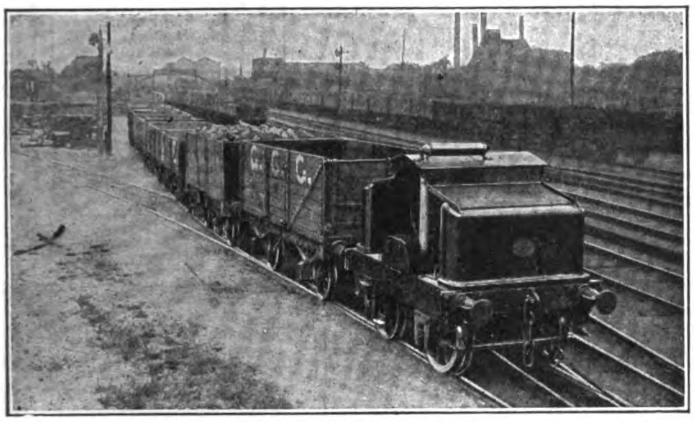
BRANCHES and SUB-BRANCHES:

TOKYO—Hakozaki-cho, Fukagawa-ku
OSAKA—Nakanoshima, Nishi, Utsubo, Aji-kawa, Nishinari, Sakurashima Chikuko
YOKOHAMA—Shinko-cho
KOBE—Kano-cho
MOJI—Hama-cho
SHIMONOSEKI—Kannonzaki-cho

MOTOR RAIL & TRAM CAR CO., LTD.

LIGHT RAILWAY ENGINEERS

Manufacturers of Internal Combustion Engines; Locomotives, Rail-Inspection and Tramcars



40 H.P. Loco Working on Main Line Siding

These vehicles are thoroughly reliable, economical, inexpensive to maintain, easily handled and entail no stand-by losses

All kinds of Light Railway Material supplied

ENQUIRIES SOLICITED

WORKS & OFFICES:
Telegrams & Cables: Motral-Bedford
Codes: A.C.B. Engineering 5th Ed & Bentley

SIMPLEX WORKS:
Bedford, England

CIGARETTE MACHINERY

800 Cigarettes per Minute!

PLAIN OR TIPPED ON

Our New "Triumph-Model U.G." Cigarette Machine

The phenomenal speed of this machine, its supreme simplicity and its low cost of upkeep, are due to the revolutionary improvements in its design and construction—the outcome of 40 years of experience in the manufacture of cigarette machinery.

This machine is an indispensable part of the equipment of any modern up-to-date factory. Old modern machines are rapidly being replaced. The measure of your success depends on your cost of production.

Write for full particulars to-day on our—

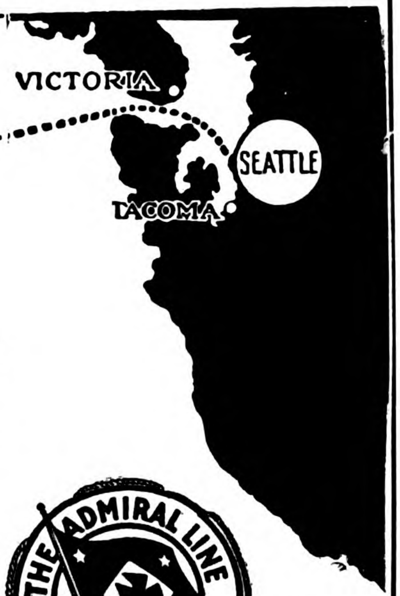
CIGARETTE MACHINES — TOBACCO STEMMING MACHINES
AUTOMATIC KNIFE GRINDERS — CIGARETTE PACKING MACHINES

UNITED CIGARETTE MACHINE CO., Inc.,
Lynchburg, Va., U.S.A.

Agents for China: AMERICAN TRADING CO.
Robert Dollar Building, SHANGHAI

SHANGHAI TO SEATTLE 16 DAYS

A New Fast American
TRANS-PACIFIC SERVICE
between MANILA-HONGKONG
SHANGHAI
KOBE-YOKOHAMA
and PUGET SOUND
VICTORIA, B.C.—SEATTLE, WASH.
VIA THE SHORT ROUTE



UNITED STATES SHIPPING BOARD 535's

		Leaving Shanghai	Arr. Seattle
President Jefferson	(X Wenatchee)	Aug. 27	Sept. 12
„ Madison	(X Bay State)	Sept. 10	Sept. 26
„ McKinley	(X Keystone State)	Sept. 24	Oct. 10
„ Jackson	(X Silver State)	Oct. 8	Oct. 24
„ Grant	(X Pine Tree State)	Oct. 22	Nov. 7

AGENTS

Manila: No. 24 Calle David, P.O. Box 1636
Hongkong: No. 2 Ice House Street.
Shanghai: No. 29-B Nanking Road, Amer. P.O. Box 503
Kobe: No. 7-A Kaigan-Dori, P.O.Box 308
Yokohama: No. 75-A Main Street, P.O. Box 326
Singapore: No. 2 Prince Street.

HEADQUARTERS FOR THE FAR EAST,
No. 29-B Nanking Road, Shanghai.
Major GEO. A. HEYBURN, Acting Manager
GEO. J. McCARTHY, Assistant General Passenger Agent.

THE ADMIRAL LINE — P.S.S.CO.

The ADMIRAL LINE

ANYWHERE ON THE PACIFIC

PACIFIC STEAMSHIP COMPANY

Amoy
Antung
Canton
Changsha
Chefoo
Chinkiang
Dairen (Dalny)
Foochow
Hankow
Harbin
Hongkong

BUTTERFIELD & SWIRE

(JOHN SWIRE & SONS, LTD.),

FRENCH BUND, SHANGHAI

Telephone No. Central 4881

AGENTS FOR

Ichang
Kiukiang
Kobe
Nanking
Newchwang
Ningpo
Shanghai
Swatow
Tientsin
Tsingtau
Wuhu
Yokohama

The Blue Funnel Line

(Ocean S.S. Co., Ltd. & China Mutual S. N. Co., Ltd.)

Fast Services

Japan, China, Hongkong, Philippines, Straits and Java to Europe via Suez Canal and to New York via Suez and Panama Canals also

Trans-Pacific between Oriental ports and West Coast of N. America.

CHINA NAVIGATION CO., LTD.

Passenger and Freight Steamship Services

SHANGHAI TO, AND FROM,

Weihaiwei, Chefoo and Tientsin (for Peking); Newchwang: Antung.

Hankow, Ichang (with connection to Chungking), Changsha, and Intermediate Yangtsze Ports.

Hongkong and Canton; Amoy and Swatow; Ningpo; and General Coasting Services.

HONGKONG TO, AND FROM,

Manila, Cebu, and Iloilo

Weihaiwei, Chefoo and Tientsin (for Peking)

Canton ; Hoihow, Pakhoi and Haiphong; Bangkok and Singapore.

Shanghai and Yangtze Ports (as above)

Sydney, Melbourne and Australian Ports (Australian-Oriental Line)

Taikoo Sugar Refining Co., Ltd.

FINEST CANE SUGARS

Taikoo Dockyard & Engineering Company of Hongkong Ltd.

Ship Builders, Ship Repairers, Engine Builders, Boiler Makers, etc.

Fire and Marine Insurance

Fire

London and Lancashire Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

Guardian Assurance Co., Ltd.

Orient Insurance Company.

British Traders Insurance Co., Ltd.

Marine

British and Foreign Marine Insurance Co., Ltd.

Standard Marine Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

Sea Insurance Co., Ltd.

Guardian Assurance Co., Ltd.

KOKUSAI KISEN KAISHA

Nominal Capital	- -	Yen 100,000,000.00
Paid-up Capital	- -	„ 87,500,000.00
Aggregate Tonnage	- -	500,000 Tons

FLEET OF STEAMSHIPS

Name	Tons D.W.	Name	Tons D.W.
Rozan-Maru	8,700	Seifuku-Maru	9,100
Vancouver-Maru	9,100	Suez-Maru	6,600
Boston-Maru	8,800	Daio-Maru	9,000
Tofuku-Maru	9,100	Kashu-Maru	8,800
Chifuku-Maru	9,100	No. 2 Kifunesan-Maru	5,000
Ryufuku-Maru	9,100	Yousan-Maru	5,000
Hankow-Maru	6,400	Taisan-Maru	5,000
Yoni-Maru	11,000	Yuri-Maru	11,000
Taibu-Maru	8,900	Texas-Maru	11,000
San Francisco-Maru	9,100	Tamatsu-Maru	6,600
Naple-Maru	9,100	Eifuku-Maru	9,100
Glasgow-Maru	9,100	Kifuku-Maru	9,100
Yayoi-Maru	8,700	Toyofuku-Maru	9,000
Yaye-Maru	11,000	Raifuku-Maru	9,100
Malta-Maru	8,700	Keifuku-Maru	9,100
Buyo-Maru	8,800	Washington-Maru	9,100
Brazil-Maru	9,100	Tokufuku-Maru	9,100
Kofuku-Maru	9,100	Portland-Maru	9,100
Yezari-Maru	6,900	England-Maru	9,100
Yugao-Maru	5,000	Chili-Maru	9,100
Yubaye-Maru	5,000	Argentine-Maru	9,100
Sydney-Maru	6,400	Port Said-Maru	9,100
Shanghai-Maru	6,400	New York-Maru	9,100
Singapore-Maru	9,100	Karorin-Maru	6,400
Jyufuku-Maru	9,100	Tasmania-Maru	6,400
Hiyeizan-Maru	6,700		

Head Office: No. 8 Kaigan-dori, Kobe

BRANCH OFFICE:

Tokyo Kaijo Building, Maruno-uchi, Tokyo, Japan

Osaka Shosen Kaisha

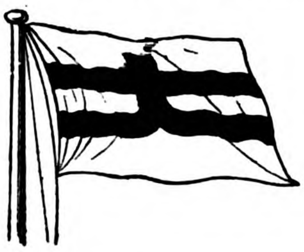
(Osaka Mercantile Steamship Co.)

HEAD OFFICE: OSAKA, JAPAN

Cable Address: "SHOSEN, OSAKA."

Branches and Agencies at all the important ports in the World.

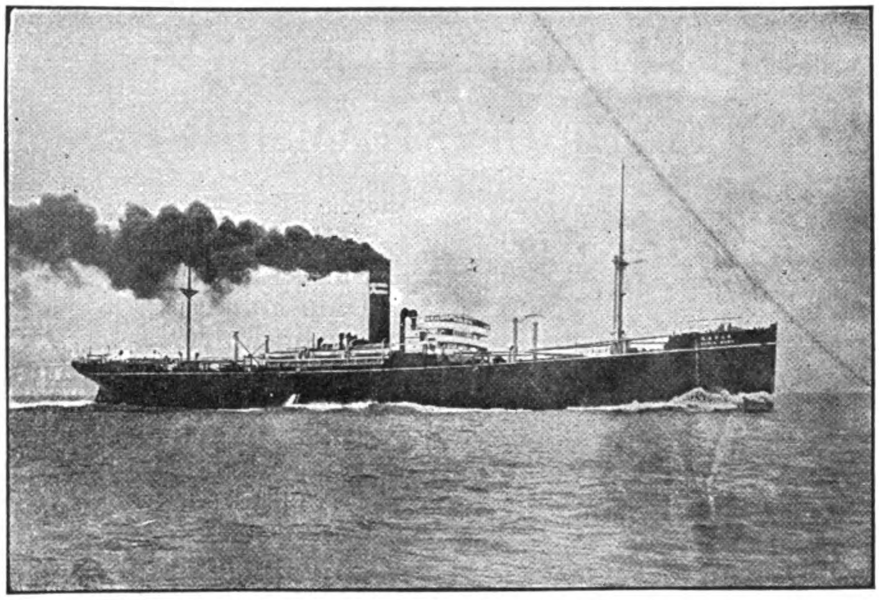
Codes Used: A1, A.B.C. 5th Ed., Scott's 10th Ed. & Bentley's.



Capital: Y. 100,000,000

Reserves: Y. 66,000,000

40 Regular Lines with a Fleet of 500,000 Tons Gross.



PRINCIPAL REGULAR LINES:

JAPAN-EUROPE LINE (via Suez)—Monthly—Ports of Call: Yokohama, Kobe, Moii, Shanghai, Hongkong, Singapore, Colombo, Port Said, Marseilles, London, Antwerp, Rotterdam and Hamburg.

JAVA-EUROPE LINE:—Monthly—Ports of Call: Sourabaya, Padan, Colombo, Port Sudan, Suez, Genoa, Marseilles, Antwerp and Hamburg.

CALCUTTA-NEW ORLEANS LINE: 7 sailings per annum—Ports of Call: Calcutta, Singapore, Hongkong, Nagasaki, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Cienfuegos and New Orleans.

SINGAPORE-NEW YORK LINE:—Monthly—Ports of Call: Singapore, Hongkong, Shanghai, Moji, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Havana and New York.

JAPAN-BOMBAY LINE:—Fortnightly—Ports of Call: Yokohama, Yokkaichi, Osaka, Kobe, Moji, Hongkong, Singapore, Colombo and Bombay.

HONGKONG-PUGET SOUND LINE:—Fortnightly—Ports of Call: Hongkong, Manila, Keelung, Shanghai, Nagasaki, Kobe, Yokkaichi, Shimizu, Yokohama, Victoria, Seattle, Tacoma and Vancouver.

JAPAN-SOUTH AMERICA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Nagasaki, Hongkong, Singapore, Colombo, Mauritius, Durban, Cape Town, Rio de Janeiro, Santos and Buenos Ayres.

JAPAN-AUSTRALIA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Osaka, Moji, Hongkong, Manila, Sydney, Melbourne and Adelaide.

JAPAN-JAVA LINE:—Monthly—Ports of Call: Osaka, Kobe, Moji, Keelung, Manila, Sandakan, Tawao, Batavia, Sourabaya and Macassar.

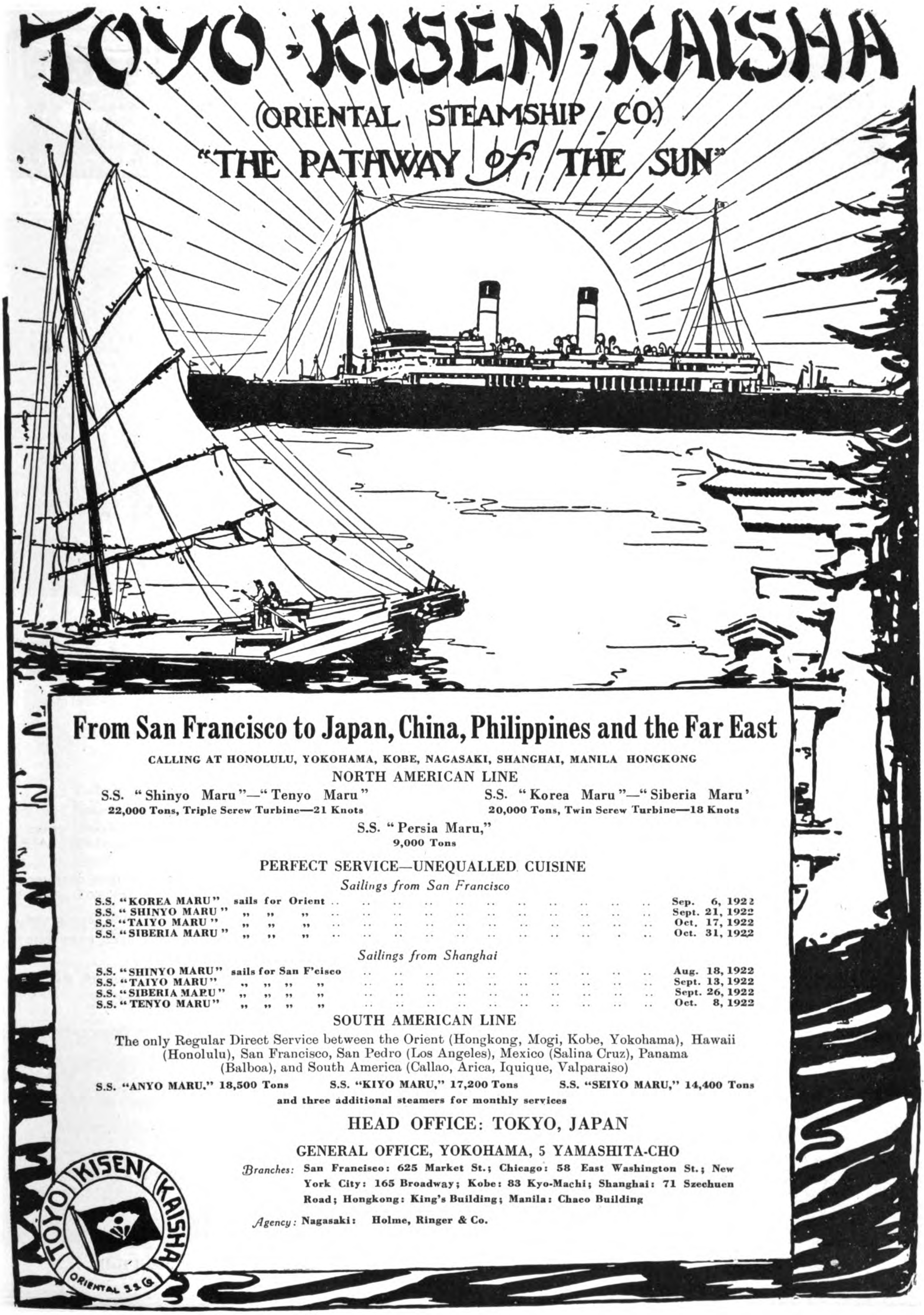
SERVICES TO CHINA.—

OSAKA—Dairen Line.—Semi-Weekly.
OSAKA—Tientsin Line.—6 Sailings per month.
OSAKA—Tsingtau Line.—2 Sailings per month.
YOKOHAMA—Dairen-Tientsin Line.—About 8 Sailings per month.
TAKAO—Tientsin Line.—2 Sailings per month.
Keelung-Hongkong Line.—Weekly.

Besides the above mentioned, Mail and Passenger Services are maintained by over THIRTY-FIVE REGULAR LINES, calling at all important ports in JAPAN, as well as STRAITS, DUTCH EAST-INDIES, FORMOSA, CHINA, KOREA, Etc., Etc.

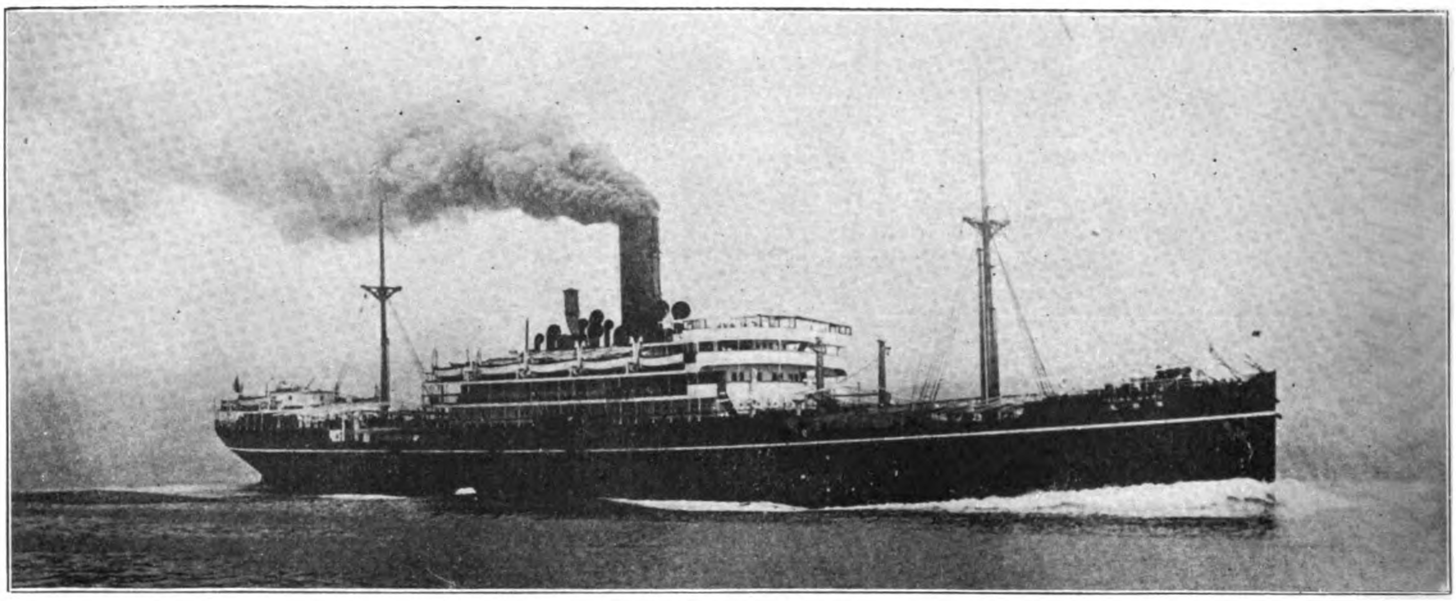
COMPANY'S LOCAL OFFICES IN CHINA

AMOY, CANTON, FOOCHOW, HANKOW, SHANGHAI, TIENTSIN, DAIREN, HONGKONG


TOYO-KISEN-KAISHA
(ORIENTAL STEAMSHIP CO.)
"THE PATHWAY of THE SUN"
From San Francisco to Japan, China, Philippines and the Far East
CALLING AT HONOLULU, YOKOHAMA, KOBE, NAGASAKI, SHANGHAI, MANILA HONGKONG
NORTH AMERICAN LINE
S.S. "Shinyo Maru"—"Tenyo Maru"
22,000 Tons, Triple Screw Turbine—21 Knots
S.S. "Korea Maru"—"Siberia Maru'
20,000 Tons, Twin Screw Turbine—18 Knots
S.S. "Persia Maru,"
9,000 Tons
PERFECT SERVICE—UNEQUALLED CUISINE
Sailings from San Francisco
S.S. "KOREA MARU" sails for Orient .. Sep. 6, 1922
S.S. "SHINYO MARU" " " " .. Sept. 21, 1922
S.S. "TAIYO MARU" " " " .. Oct. 17, 1922
S.S. "SIBERIA MARU" " " " .. Oct. 31, 1922
Sailings from Shanghai
S.S. "SHINYO MARU" sails for San F'cisco .. Aug. 18, 1922
S.S. "TAIYO MARU" " " " " .. Sept. 13, 1922
S.S. "SIBERIA MARU" " " " " .. Sept. 26, 1922
S.S. "TENYO MARU" " " " " .. Oct. 8, 1922
SOUTH AMERICAN LINE
The only Regular Direct Service between the Orient (Hongkong, Mogi, Kobe, Yokohama), Hawaii (Honolulu), San Francisco, San Pedro (Los Angeles), Mexico (Salina Cruz), Panama (Balboa), and South America (Callao, Arica, Iquique, Valparaiso)
S.S. "ANYO MARU." 18,500 Tons S.S. "KIYO MARU," 17,200 Tons S.S. "SEIYO MARU," 14,400 Tons
and three additional steamers for monthly services
HEAD OFFICE: TOKYO, JAPAN
GENERAL OFFICE, YOKOHAMA, 5 YAMASHITA-CHO
Branches: San Francisco: 625 Market St.; Chicago: 58 East Washington St.; New York City: 165 Broadway; Kobe: 83 Kyo-Machi; Shanghai: 71 Szechuen Road; Hongkong: King's Building; Manila: Chaco Building
Agency: Nagasaki: Holme, Ringer & Co.
TOYO KISEN KAISHA
ORIENTAL S.S. CO.

NIPPON YUSEN KAISHA

HEAD OFFICE, TOKYO, JAPAN



"SUWA MARU"

OVER THE

THE PALATIAL STEAMERS OF THE N.Y.K.

WILL CARRY YOU IN COMFORT, CLEANLINESS AND WITH COURTESY

PRINCIPAL SERVICES

EUROPEAN LINE (Fortnightly)

WEST COAST LINE (Monthly).
GLASGOW, BIRKENHEAD, AND SWANSEA (occasionally).
SINGAPORE, HONGKONG, SHANGHAI AND JAPAN.

NORTH CONTINENTAL LINE (Monthly).
HAMBURG, GRANGEMOUTH, ROTTERDAM AND ANTWERP.
STRAITS, JAVA, CHINA AND JAPAN.

NORTH AMERICAN LINE (Every 3 Weeks).
HONGKONG, MANILA, SHANGHAI, KOBE AND YOKOHAMA.
VICTORIA, B.C., AND SEATTLE.

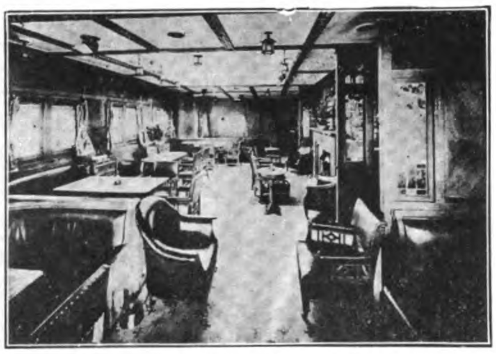
SOUTH AMERICAN LINE (Every 2 Months)
KOBE, SINGAPORE, DURBAN AND CAPETOWN.
SANTOS, RIO DE JANEIRO AND BUENOS AIRES.

AUSTRALIAN LINE (Monthly).
YOKOHAMA, KOBE, HONGKONG, MANILA, ZAMBOANGA, THURSDAY ISLAND, TOWNSVILLE, BRISBANE, SYDNEY AND MELBOURNE.

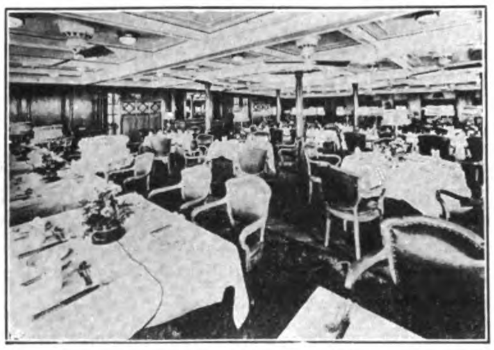
BOMBAY LINE (Fortnightly).
KOBE, SHANGHAI, HONGKONG, SINGAPORE, MALACCA, COLOMBO, TUTICORIN AND BOMBAY.

CALCUTTA LINE
(FORTNIGHTLY) YOKOHAMA, KOBE, HONGKONG, SINGAPORE, PENANG, RANGOON AND CALCUTTA.
(MONTHLY) CALCUTTA, MADRAS, COLOMBO, SUEZ, PORT SAID, ALGIERS AND NEW YORK.

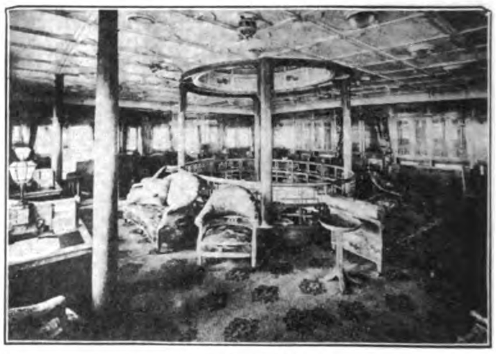
NEW YORK-FAR EAST LINE (Fortnightly)
KOBE, YOKOHAMA, SAN FRANCISCO, PANAMA, COLON, HAVANA AND NEW YORK.
NEW YORK TO JAPAN, CHINA AND PHILIPPINES.



Smoking Room



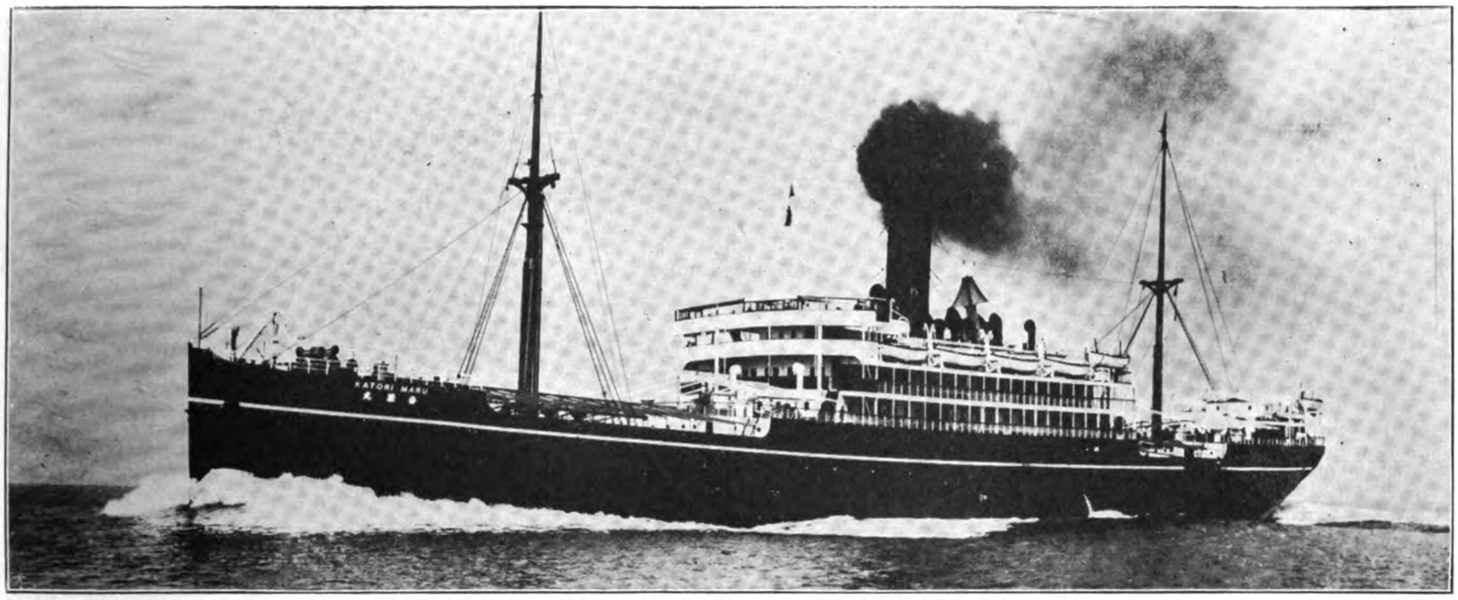
Dining Saloon



Social Hall

NIPPON YUSEN KAISHA

FLEET: 114 STEAMERS, 574,594 GROSS TONS



"KATORI MARU"

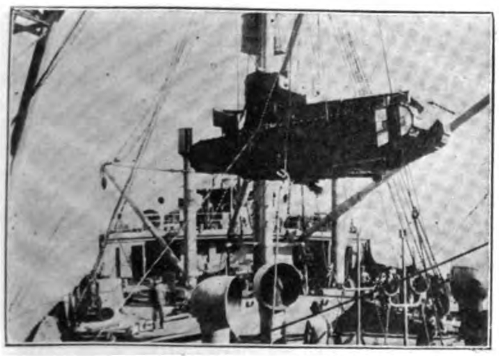
SEVEN SEAS

SHIPPERS WILL FIND QUICK DISPATCH, WITH WHARF, WAREHOUSE AND TERMINAL FACILITIES AT ALL PRINCIPAL PORTS SERVED BY N.Y.K. STEAMERS

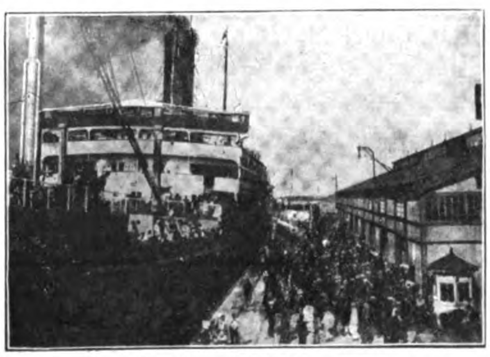
PRINCIPAL BRANCHES AND AGENCIES

Yokohama	Tokio	Nagoya	Keelung
Kobe	Moji	Nagasaki	Hankow
Hakodate	Otaru	Tientsin	Singapore
Tsingtao	Hongkong	Canton	Bombay
Penang	Colombo	Calcutta	Liverpool
Port Said	Marseilles	London	Chicago
Antwerp	Rotterdam	New York	Brisbane
Seattle	Manila	Townsville	Shanghai
Sydney	Melbourne	Osaka	

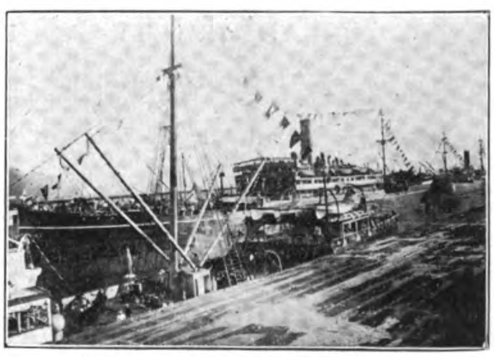
GIVE JAPANESE STEAMSHIPS THEIR SHARE OF YOUR JAPANESE CARRYING TRADE



Landing a Tank



Dock at Yokohama



Great Northern Dock at Seattle

Chartered Bank of India, Australia and China

INCORPORATED BY ROYAL CHARTER, 1853

Capital	**£3,000,000**
Reserve Fund	**£3,700,000**
Reserve Liabilities of Shareholders .	**£3,000,000**

Head Office: 38 BISHOPSGATE, LONDON, E.C.
Shanghai Branch: 18 THE BUND.

Court of Directors:

SIR MONTAGU CORNISH TURNER, *Chairman.*
SIR DUNCAN CARMICHAEL
THOMAS CUTBERTSON, Esq.
SIR ALFRED DENT, K.C.M.G.
SIR WILLIAM HENRY NEVILLE GOSCHEN, K.B.E.
THE RIGHT HON. LORD GEORGE HAMILTON, G.C.S.I.
SIR JOHN NEWALL JORDAN, P.C., G.C.I.E., K.C.B., K.C.M.G.
WILLIAM FOOT MITCHELL, Esq.
JAMES MAXWELL GRANT PROPHIT, Esq.
LEWIS ALEXANDER WALLACE, Esq.

Chief Manager: W. E. PRESTON
Managers: J. S. BRUCE & G. MILLER

Bankers:

THE BANK OF ENGLAND.
THE LONDON JOINT CITY & MIDLAND BANK, LTD.
THE LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.
THE NATIONAL PROVINCIAL & UNION BANK OF ENGLAND, LTD.
THE NATIONAL BANK OF SCOTLAND, LTD.

Agencies and Branches:

Alor Star (Kedah)	Bombay	Colombo	Iloilo	Kuala-Lumpur (F.M.S.)	New York	Saigon	Taiping (F.M.S.)
Amritsar	Calcutta	Delhi	Ipoh	Madras	Peking	Seremban	Tavoy L. Burma
Bangkok	Canton	Haiphong	Karachi	Manila	Penang	Shanghai	Tientsin
Batavia	Cawnpore	Hankow	Klang	Medan	Puket	Singapore	Yokohama
	Cebu	Hongkong	Kobe		Rangoon	Sourabaya	

Drafts granted on the above Agencies and also on the principal Commercial Cities throughout the world. Bills of Exchange bought and received for collection. Travellers' Letters of Credit issued and every description of Banking and Exchange business undertaken.

C. J. SCOTT,
Manager.

ATTWATER & SONS

MANUFACTURERS OF ALL KINDS OF

STEAM ENGINE and HYDRAULIC PACKINGS

PRESTON'S PERFECT PACKING The Best Self-setting Wedge Packing made

SILVERINE METALLIC For Acids and Superheated Steam

ADMIRALTY ANTI-FRICTION in Skins, known also as "Sausage Packing" and

"Belleville Packing" The Best Floating Metallic Packing made

And all varieties of Frictionless, Graphited and Greasy Packings, made from

ITALIAN HEMP, ASBESTOS, COTTON, Etc.

Hopwood Street Mills, PRESTON, Eng. ESTABLISHED 1868

Telegrams: "Attwaters, Preston" *Telephone No.:* 1045 (2 lines) *Codes:* 5th Edition A.B.C., and Western Union

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVIII SHANGHAI, AUGUST, 1922 No. 8

SUMITOMO

A Prince of Industry

IT is difficult for the modern captain of industry to hide his light under the proverbial bushel. The press will eventually find him, pry out the story of how he did it and hold him up as a model for the rising generation to emulate. The story of America's millionaires has been told and retold. The successful British businessman rarely makes a fuss about these things. They are all in the day's work. But for shrinking modesty about industrial success one has to come to Japan to find a group of conservative, retiring and reticent captains of industry whose enterprises are part of the story of Japan's advance and whose beginnings are lost in the dim pages of past history. Their phenomenal rise in the past two decades equals, if not surpasses, many of the more widely known western names whose success is chronicled as part of modern history. It is only through official reports, the occasional stories that appear in some Japanese publication and by visiting the country that one gathers an idea of the full extent of the operations of such concerns. The Japanese captain of industry is not talkative. He avoids interviews. In fact, when it comes to publicity about himself, he has nothing to say. The barrier of language keeps his fame within the boundaries of his own country.

Back in the closing years of the seventeenth century, when America was still the Thirteen Colonies and England was about to establish a national banking institution, a copper mine was discovered along the shores of the Inland Sea of Japan and was opened and worked by the lucky discoverer. So was born the house of Sumitomo, a name to conjure with in present-day Japan. From this beginning 232 years ago, there has grown one of the most important enterprises of the world, which to-day operates with a total capital of nearly Yen 250,000,000 and controls copper, gold, silver, coal and iron mines, smelters, refineries, tube, wire and nail factories, fertilizer and lumbering enterprises, warehouses, steel works and a bank with Yen 70,000,000 capital having branches in all the principal cities of Japan and the Far East, as well as in London, New York, Bombay, San Francisco, Honolulu and Seattle. Where goes the trade of Japan, goes the house of Sumitomo. In a recent speech at Tokyo, Secretary of the Navy Denby described the bushido of old Japan as the "Way of the Gentleman." The house of Sumitomo lives up to this definition of the chivalry of Nippon and wherever it goes throughout the world, it carries with it the bushido of business, a guarantee that the highest and best traditions of Japan still live in the present-day struggle for trade.

For nearly two centuries the firm of Sumitomo confined its activities largely to the development of its mining interests, carrying on the work with unwearied research and scrupulous adherance to a code of business ethics which won for its products the highest place in the copper markets of Japan and as time passed, in the outside world. With the growth of the mining business and the accumulation of profits, the house of Sumitomo branched out into banking, advancing large sums to the Daimyos under the Shogunate and the merchants of the city of Osaka, which was then gaining its prominent position as the centre of commerial and industrial Japan. The Osaka of to-day, that great smoking behive of Asiatic industry, was made possible, in part, through the civic pride of the Sumitomo firm which for over two centuries has maintained its head office there and identified itself with its growth and prosperity.

With an output of 1,497 tons in 1698, the Besshi Copper Mine on the Inland Sea of Japan took its place as one of the world's great producers, a place it has held until now it is treating 233,000 tons of ore and producing some 3,000 tons of refined and 11,230 tons of electrolytic copper, with every indication that it will continue to produce indefinitely without any alteration in quality. Shortly after the restoration, the Sumitomo firm opened a special office at Kobe for the export of its copper products, and with the progress of Japan and the expansion of the firm's activities, the selling organization has now its own offices in all the leading cities of Asia, and several in Europe and America.

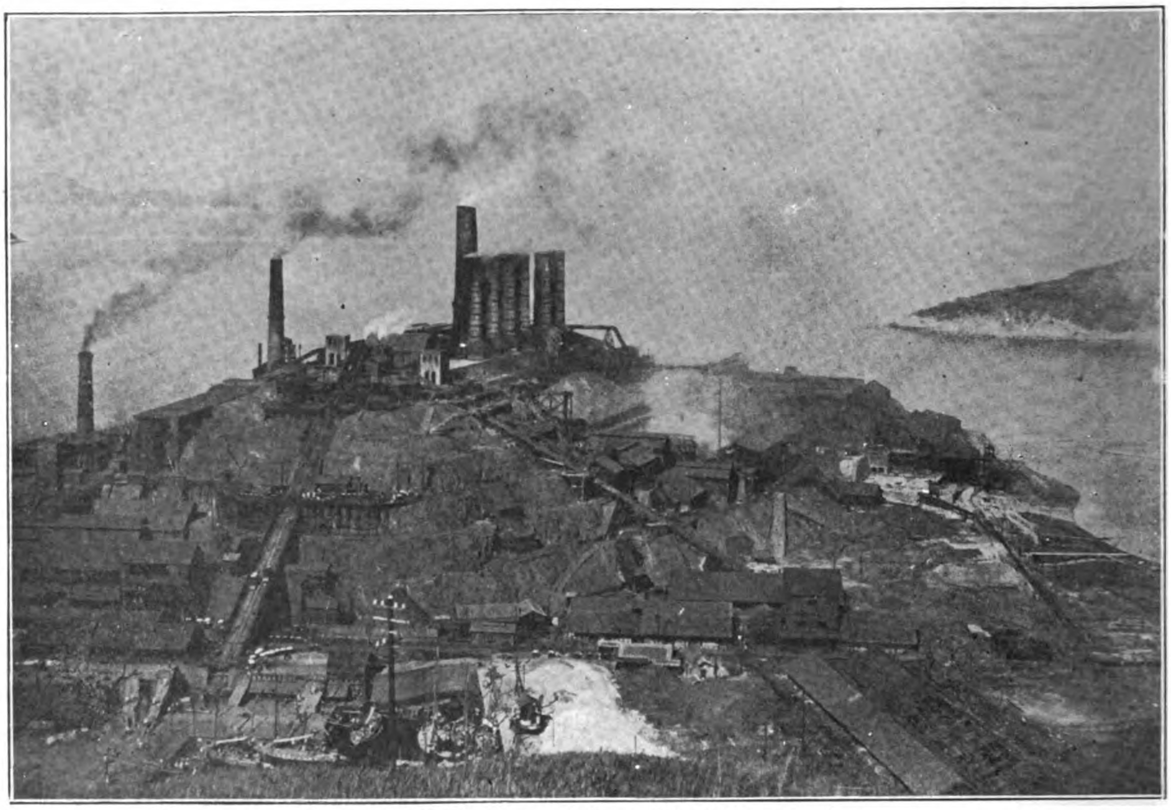
In 1894, the firm bought out a copper rolling concern in Osaka and under the name of the Sumitomo Copper Works started to manufacture copper rods, plates, tubes and wires from the output of the Besshi mine. Three years later, a branch factory was established at Nakanoshima for the manufacture of zinc plates, rods and aluminium plates and wires. In November, 1895, the manufacture of insulated wires and electric cables was commenced, and in November of the following year solid and drawn tubes were successfully turned out. Later a plant was erected to make large copper sheets, and a branch factory erected at Amagasaki for the manufacture of wire nails, and galvanized wire. Constant improvements and the installation of the most modern equipment has maintained these plants at a high state of efficiency. The quality of the products has steadily advanced, being specified and approved for use in all Japanese government work, especially for the navy.

In 1894, the firm acquired coal properties in Kyushu producing excellent coking coal from the Tadakuma mine and from the Kiuragi mine some of the best steaming coal in Japan. The output of the two mines, which during the war reached 500,000 tons is now about 300,000 tons. In 1901, the firm entered upon one of its most important enterprises by purchasing the plant of the Nippon Steel Works located in Osaka, launching out as the first private steel works in Japan. These works have a melting capacity of 40,000 tons of acid and basic steel, which is converted into wheels, axles, rollers, shafting, cylinders, gear wheels, ship and engine parts. Its products are approved not only by the Japanese government but by Lloyd's for their A1 specifications.

In 1911, the wire and cable factory of the firm was made independent of the copper works under the name of the Sumitomo Electric Wire and Cable Works, which is now capitalized at Y.12,000,000 and is producing all kinds of electric wires, insulated and armoured cables and other conductors. In addition, a fertilizer factory was established in 1913 near the Besshi Copper Mine, where the ores are treated for their sulphur content, producing sulphate, nitrate and super-phosphates and compound fertilizers which are sold direct to the farmers through the firm's own representatives in each prefecture.

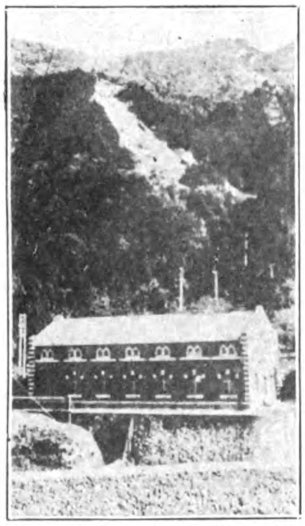
In addition to the copper and coal mines, the firm has developed gold and silver mines in the Hokkaido and it is expected that the proverbial luck of the Sumitomos will hold good and these will also enjoy as wide a reputation as the copper properties.

At the head of these prosperous enterprises stands the energetic descendent of a long line of noble ancestors, Baron Kichizayemon Sumitomo, the younger brother of Prince Tokudaiji (ex-lord chancellor to the late Emperor) and of Marquis Saionji, the last of the elder statesmen. He was adopted into the Sumitomo family in 1892 when twenty-eight years of age. In 1897 he set out on a tour of Europe and America. It was not the usual tour of the pleasure-seeking nobleman of other countries. His days were spent in visiting factories and mines, studying their organization, ways of conducting business and especially the methods for the promotion of the welfare and happiness of the workers. He was equipping himself for the huge task that some day he would be called upon to shoulder in directing the affairs of his house. Rarely indeed, is the picture presented of the descendent of a long line of princes surrendering the ease of aristocratic surroundings and court life to enter the turmoil of business in order that he might better serve his nation and advance the well-being of his dependents. Soon after his return from this tour, he was elected to the house of peers, but resigned in order to apply himself more closely to the development of the interests entrusted to his care. In 1911, he was created a baron in recognition of his services to the nation in advancing its industries. Since then he has devoted himself entirely to the management of the vast interests of the family he cast his fortunes with.


Sumitomo Besshi Copper Mine: Shisakajima Smelter

The solicitude shown for the welfare of the employees by the head of the house is reciprocated by an intense loyalty that cannot be duplicated in any similar enterprise in the world.

The control of the vast Sumitomo enterprises is centred in a *honten* or head office under the name of the Sumitomo Goshi Kaisha, a limited partnership at the head of which stands Baron Sumitomo. For the management of the firm's enterprises there is a board of seven directors and three managers who direct the affairs of the various enterprises and account to their head for all affairs of importance and see that his policy and instructions are rigidly adhered to. This central board is composed of the actual heads of the subsidiary companies. Its present composition will indicate the close working of the organization. The president is the head of the house, Baron Sumitomo. The directors are Masaya Suzuki (head director) who acts as general manager for the Sumitomo family. Here we have a high type of Japan's executives, an experienced lawyer who resigned from the government service to accept the management of the Besshi Copper Mine, and is now chairman of the board of the Sumitomo Electric Wire and Cable Works and of the Sumitomo Steel Works and a director of the Sumitomo Bank. Mr. Kwankichi Yukawa, president of the Sumitomo Bank, is undoubtedly one of the strongest characters on the central board, recognized as one of the most brilliant financiers of the empire. Mr. Chojiro Kusaka is manager of the extensive warehouse system of the firm; Mr. K. Ohdaira is the general manager of the Besshi Copper Mine and Mr. Junkichi Matsumoto is general manager of the Sumitomo Copper Works. In addition, there is Mr. Tadateru Sumitomo, a member of the family and Mr. Masatsune Ogura. The actual management of the head office is entrusted to three managers, Mr. M. Ogura, Mr. K. Honjo (who also directs the forestry and lumbering interests of the firm) and Mr. Naoji Hidaka.


3,000 kw. Hydro-Electric Plant Supplying Power to the Besshi Copper Mine

Fourth Adit, Besshi Copper Mine

Each department of the various enterprises has its own executive who reports to his special director on the central board.

The old policy of the firm was one of self-centralization and conservatism which limited its scope of operations to Japan and its foreign business to copper ingots. Under the new policy inaugurated about a decade ago, and under the guidance of the new central board, it began to expand and keep in touch with world movements. To-day, the Sumitomo activities cover the world.

Under the control of the central board of directors of the Sumitomo Goshi Kaisha are the following companies:—

The Sumitomo Besshi Copper Mining Office; The Sumitomo Wakamatsu Coal Department; The Sumitomo Fertilizer Factory; The Sumitomo Copper Works; The Sumitomo Warehouses; The Sumitomo Forestry Department. In addition, there are the following subsidiary companies:—The Sumitomo Electric Wire and Cable Works, Ltd., capitalized at Yen 10,000,000; The Sumitomo Bank,

Ltd., capitalized at Y.70,000,000 and the Sumitomo Steel Works, Ltd., capitalized at Y.12,000,000. The capital of the Sumitomo Goshi Kaisha is placed at Y.150,000,000 and with the subsidiaries this makes a total of Y.242,000,000.

We give herewith a brief description of the various enterprises mentioned above.

Sumitomo Besshi Copper Mining Office

NIIHAMA, IYO

Mr. Komadzuchi Ohdaira, *General Manager.*
Mr. Unosuke Okada, *Manager.*

The Mt. Besshi concession covers over an area of some 7,000 acres, at 3,000 to 4,000 feet above sea-level, 12½ miles distant from the northern shore of Shikoku island. From its discovery, two hundred and thirty years ago, the output has been as follows :

Period	Years	Refined Copper, produced. Eng. ton.
1691—1867	177	43,508
1868—1877	10	12,933
1878—1887	10	25,454
1888—1897	10	48,094
1898—1907	10	49,216
1908—1917	10	78,600
Total 1691—1917	227	257,805

The annual output of ore is now about 233,000 tons, producing 3,000 tons of refined and 11,230 tons of electrolytic copper. When its output was about 1,499 tons in 1698, this mine must have been the foremost on earth. In the middle of the 19th century, the output began to fall, but with the installation of improved and better European methods for mining, transportation and metallurgical treatment, a steady increase has been maintained.

The Sumitomo's refined copper, or "K.S. Ingot of Japan," has very few metallic impurities. The Besshi refined copper contains 99.7 per cent. and the electrolytic 99.9 per cent. copper. It is of an exceedingly beautiful rose color and specially suitable for the manufacture of brass. It is sold at figures above the "B.S." brand on London market.

GEOLOGY.—The geological formation of the Besshi Mine is crystalline schist consisting of quartz-sericites and chlorite, between which lies the ore deposit, 5,000 feet long and 2 to 25 feet thick outcropping at the height of 4,000 feet above sea-level. The present working point is 3,000 feet, at the deepest, below the outcrop. The ores are cupriferous iron pyrites, with an average 3 per cent. of copper.

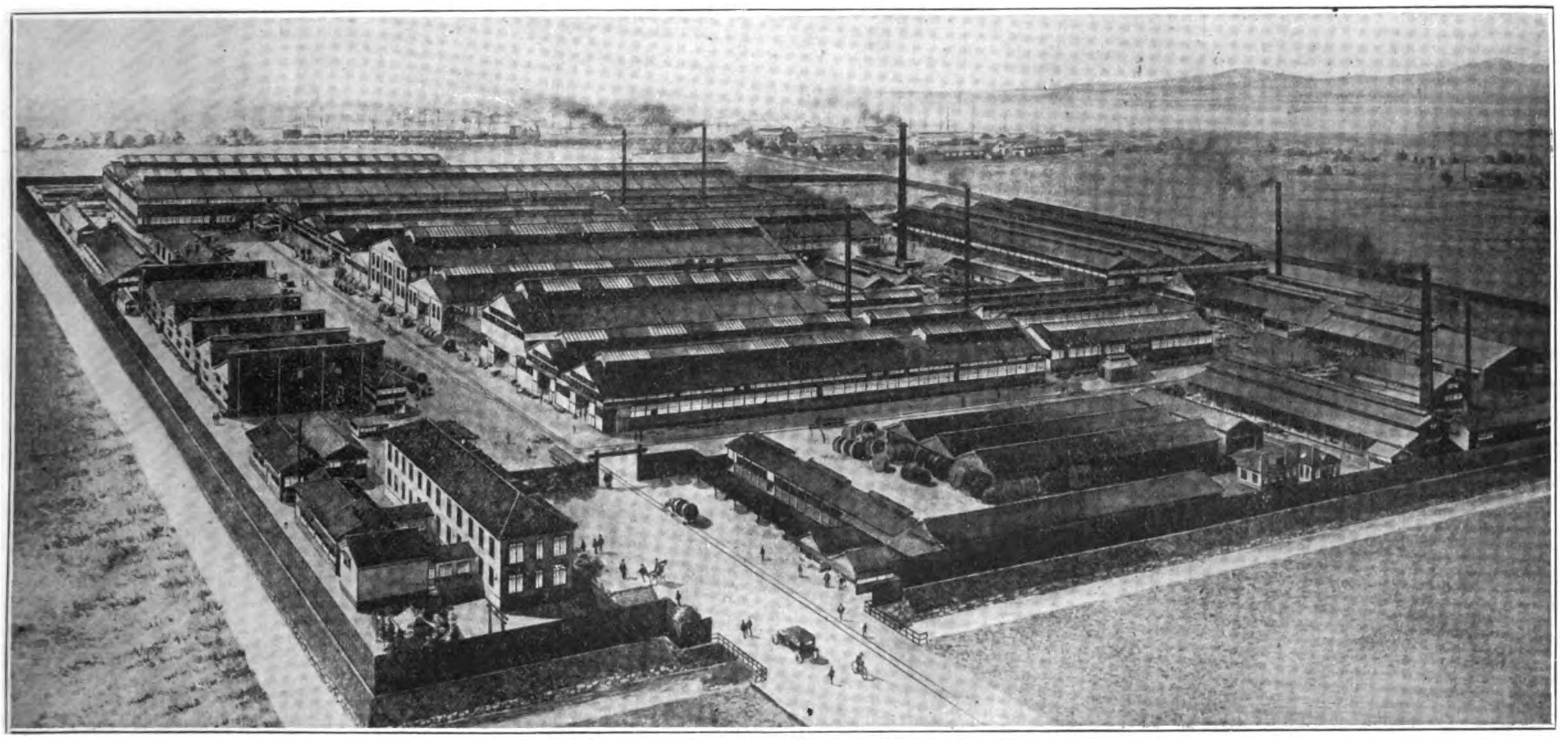
MINING.—An inclined shaft is sunk 1,782 feet along the dip of the ore deposit starting at the outcrop and having cross-cuts at every 260 feet with 8 levels. The shaft was sunk under the superintendence of M. Raloque, a French engineer, then in the service of the firm. There are two adits called "first" and "third" adits and a fourth 12 feet wide and 15,000 feet long and a blind vertical shaft, connecting the third and the fourth adit, 17 feet in diameter and 1,950 feet in depth.

Ores are excavated by overhand stopping, hand-borers and hand-drills from the Pneumatic Company of Chicago and rock-drills of the Schramm and Walter Leyner type, and one improved by Dr. H. Kudo, mechanical engineer of the firm, are used.

DRESSING.—The crude ores are carried out of the mine to Tonaru on electric trolleys, where they are screened, crushed and picked according to the copper content. The dressing plant is on the sea-ward side of Mt. Besshi, and has a capacity of 1,000 tons a day.

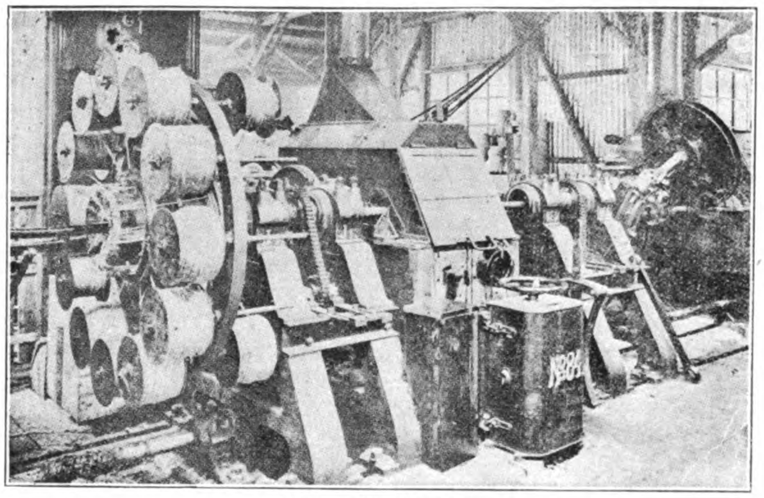
CEMENTATION.—Lest the mine-water charged with sulphuric acid, sulphate of copper and iron and other ingredients should damage the farms in the neighborhood, it is treated in cementation plants and then run direct to the sea by a drain, 10 miles long and 1½ feet square which is specially constructed for the purpose. A large tower-system cementation plant is now building.

METALLURGY.—The sorted ores are sent down to Niihama, where the main office for the mine stands, by aerial tramway and light railway. Between Niihama and Shisakajima island (9½ miles) a fleet of ore-boats ply daily carrying an aggregate of 400,000 long tons of ore in a year. On the island there is a modern smelter and a process of pyrite-smelting is in use. For fine ore and flue dust the most perfect pot-roasting plant is arranged. As the smelter is on an island more than nine miles distant on all sides from the farms, the fumes do not interfere with vegetation. A cable connects the island with Niihama. The matte from the blast-furnace is converted into crude copper by a Bessemer converter and "Atebuki," an improved method of the old "Mabuki" process. The refined copper is moulded into ingots known as the "K.S. Ingot of Japan."

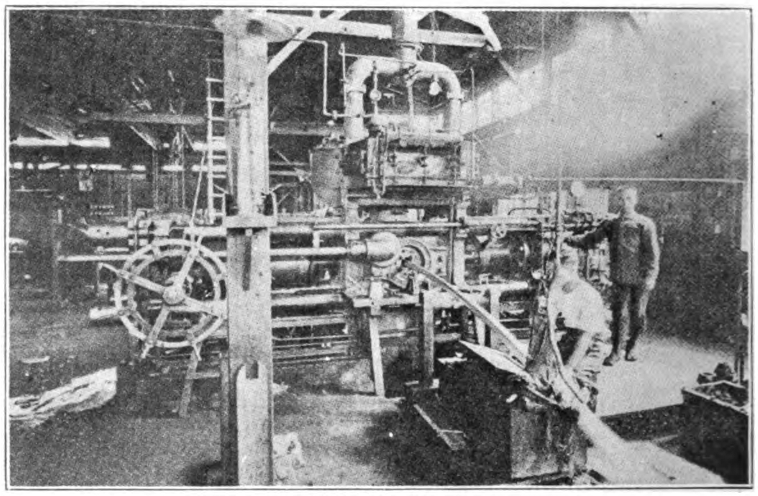


The Sumitomo Electric Wire and Cable Works

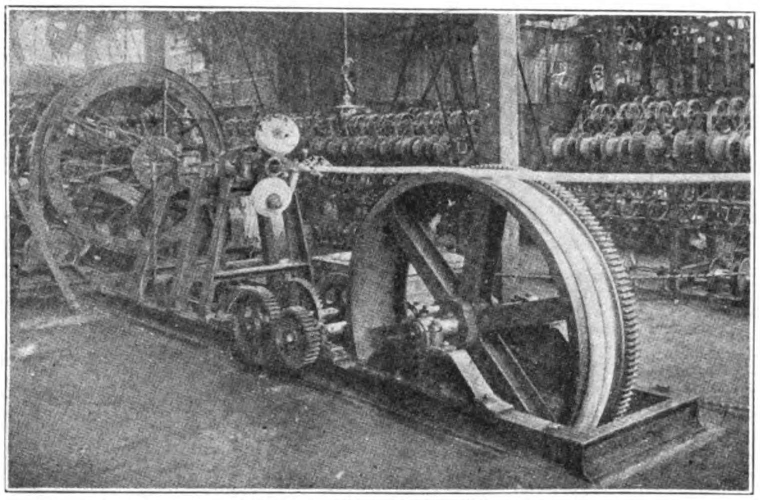
SUMITOMO ELECTRIC WIRE AND CABLE WORKS



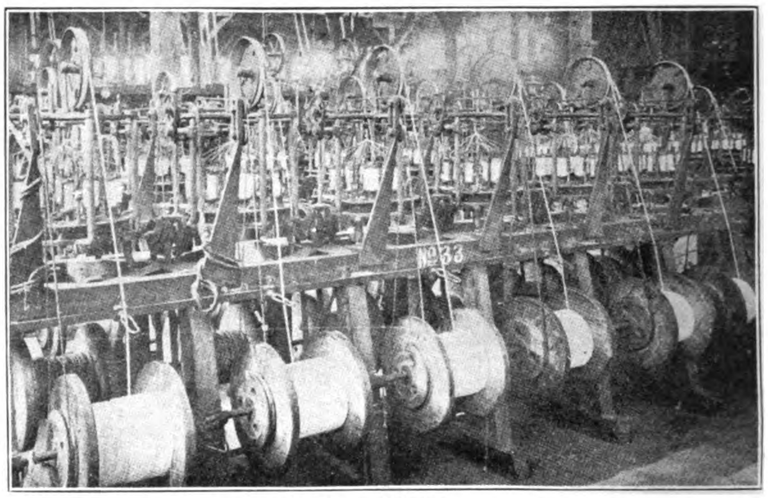
Armouring Machine



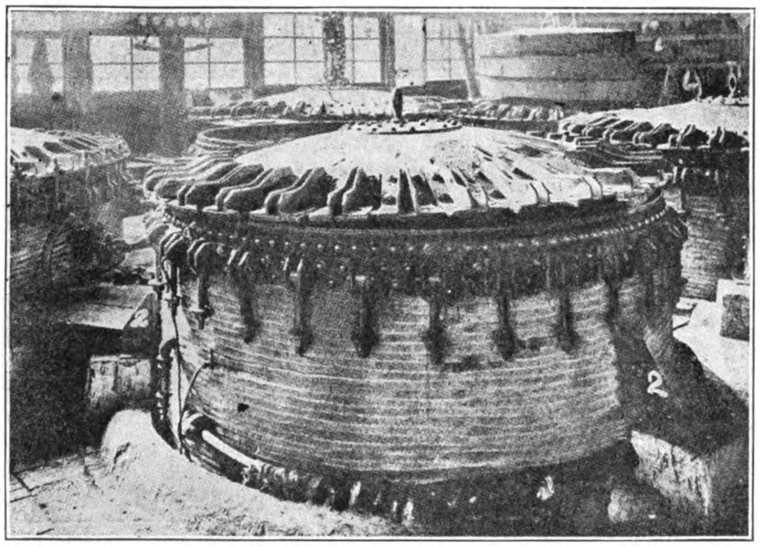
Lead Sheathing Machine



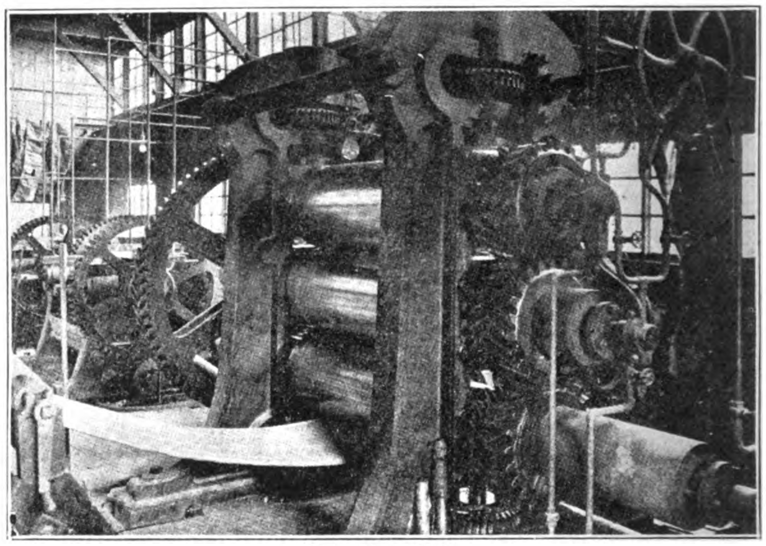
Telephone Laying Machines



Braiding Machines



Vacuum Tanks

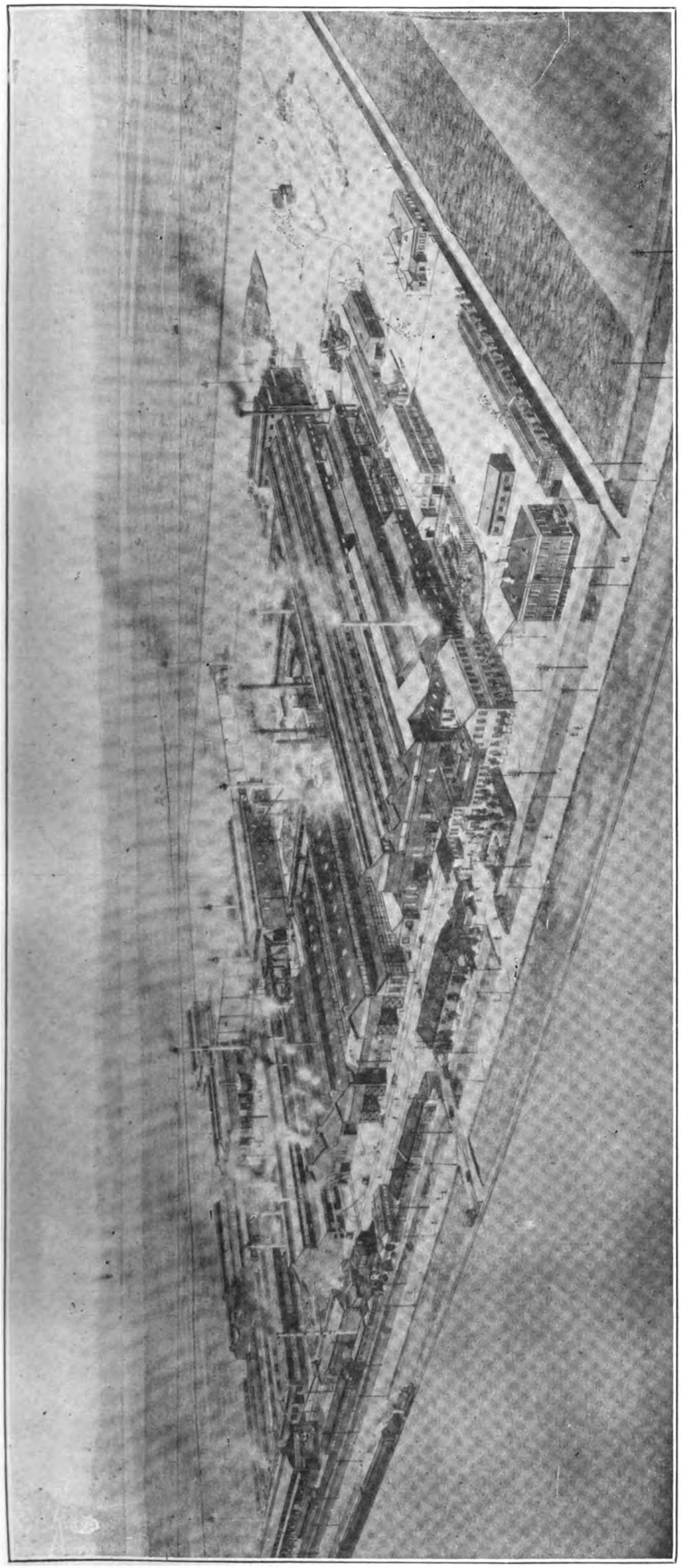


Calender Rolls

Motive Power and Transportation.—The motive power for the mining operations is derived from a 3,000 kw. hydro-electric plant. The water is led from Hiura on the eastern side of Mt. Besshi through an adit into the mine and along the third adit to Tonaru and then to Ishigasanjo, on the opposite side of the mountain. The fall is 1,969 feet with a volume of about 25 cubic feet per second. The power for metallurgical operations is generated by steam.

For ore and provision transport between Niihama and Tonaru, there is a light railway of six miles running from Niihama to Hateba and an aerial tramway of 12,276 feet which connects Tonaru and Kuroishi. For ore conveyance to Shisakajima, there is one tugboat and twenty-four sailing vessels plying daily. For copper ingots, passengers and general freight, the firm owns three steamers in daily service between Osaka and Niihama touching at Kobe, Onomichi and other places. For communicating among the many offices, a private telephone system with 247 'phones is provided.

Accessory Enterprises.—As regards accessory enterprises in which the Sumitomo Besshi mining office is engaged, mention



The Sumitomo Steel Works

may be made of the manufacture of coke used by the Shisakajima smelter and other works of the firm. Besides, they have mechanical shops for making and repairing mining tools. Meteorological stations are erected at all places of importance. Forestry goes hand in hand with the mining industry and the Sumitomo is pushing this work with vigor in the mining districts. It owns 30,000 acres and holds 50,000 acres on lease from the government for this purpose.

WELFARE OF EMPLOYEES.—There are about 5,200 men on the pay-roll, 3,700 men in the mining department and 1,500 in the metallurgical. The promotion of their welfare has long been the care of the executives of the firm. At Niihama, a hospital has been established with branches at Tonaru, Shisakajima and two other places and medical aid provided free in case of accidents. Free primary schools are maintained for boys and girls of all the employees. Amusements and recreations are provided; theatrical and other entertainments are given from time to time. Houses are built and let to employees at a moderate rent. Daily necessaries are supplied at a very cheap price by the stores conducted under the firm's supervision.

Sumitomo Wakamatsu Coal Department

WAKAMATSU, CHIKUZEN, KIUSHU

Mr. Yoshiharu Yoshida, *General Manager.*

Through this department of the firm, coal from the Tadakuma Mine is disposed of. The concession includes the Kiuragi Mine of 1,000 acres and the Ohse Mine of 1,700 acres. The total area of the concession is 40,000 acres, of which 4,500 are being worked and the balance held for development. It yields black and bituminous coal of high heating value. The coal is very suitable for making coke. The output is as follows:

1911	322,000 tons
1912	376,000 ,,
1913	384,000 ,,
1914	374,000 ,,
1915	352,900 ,,
1916	331,000 ,,
1917	324,000 ,,
1918	263,000 ,,
1921 (about)..	300,000 ,,

The Tadakuma colliery is worked by two inclines, one 2,256 feet in length with an inclination of 20° and the other 5,304 feet long inclined at 14°. The coal is conveyed to the screening plants by an endless rope-system. Within the mine, everything in the way of modern appliances is employed for the sake of economy in labor and the welfare of the workmen. For the driving of turbine pumps and sinking shafts, an electric power plant of 400 kw. is installed. Transportation facilities are all that could be desired; the Chikuho branch line of the Imperial Japanese Railways passes near the colliery. Over 3,000 men are employed.

Sumitomo Warehouse

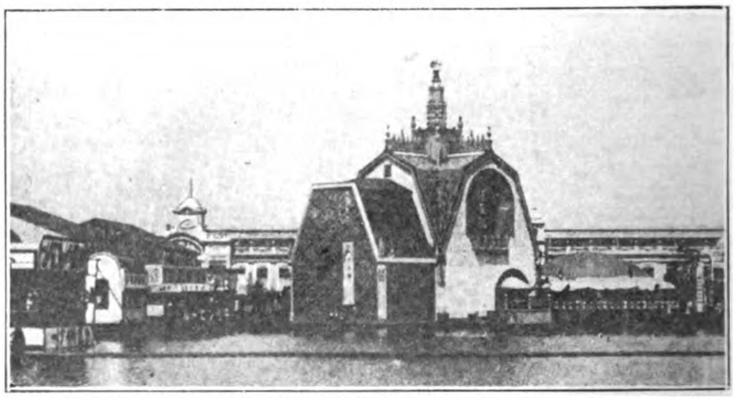
NAKANOSHIMA, OSAKA

Mr. Chojiro Kusaka, *Manager*

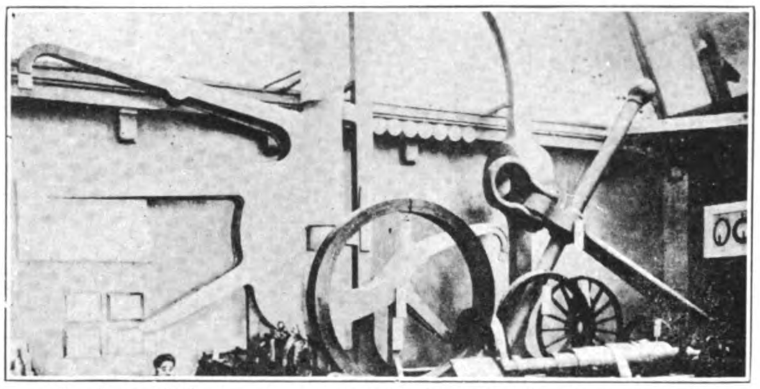
The Sumitomo warehouses were originally established for the purpose of storing goods taken by the Sumitomo Bank on mortgage. They were made independent of the Bank in 1899 and organized into a separate department to carry on a general warehousing business.

THE SUMITOMO EXHIBIT AT THE PEACE EXPOSITION, UYENO PARK, TOKYO

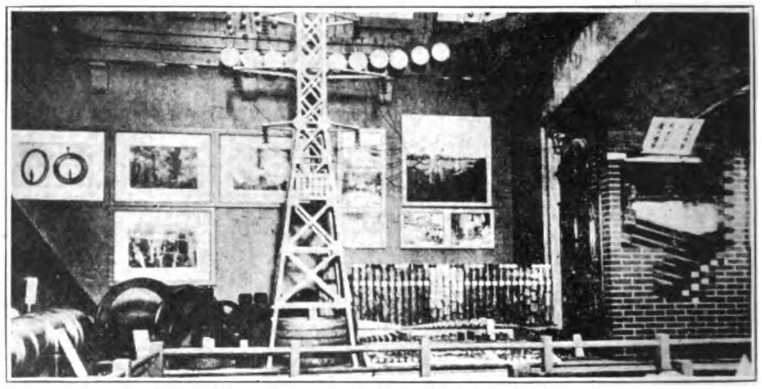
Visit of the Crown Prince to Uyeno. Entering the Sumitomo Palace



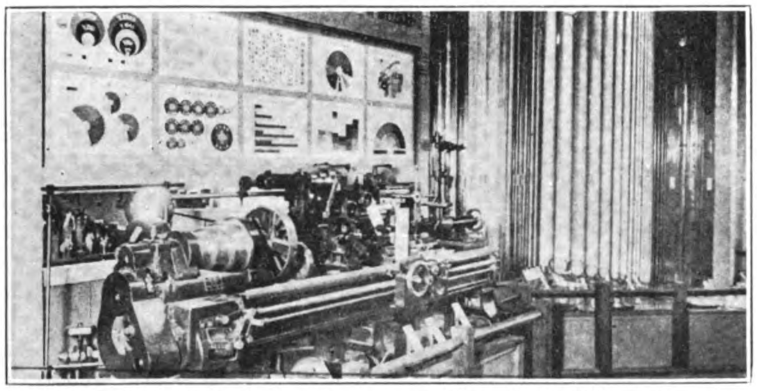
The Magnificent Gothic Edifice housing the Sumitomo Exhibits



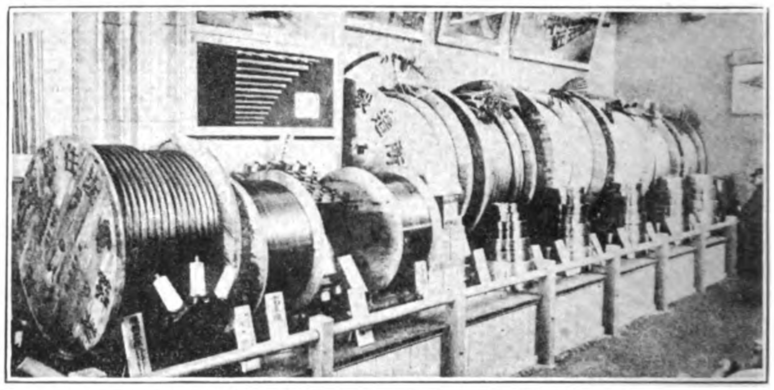
Products of the Sumitomo Steel Works. Rudder Frames, Piston Rings, Anchors, Shafting, Guns, etc.



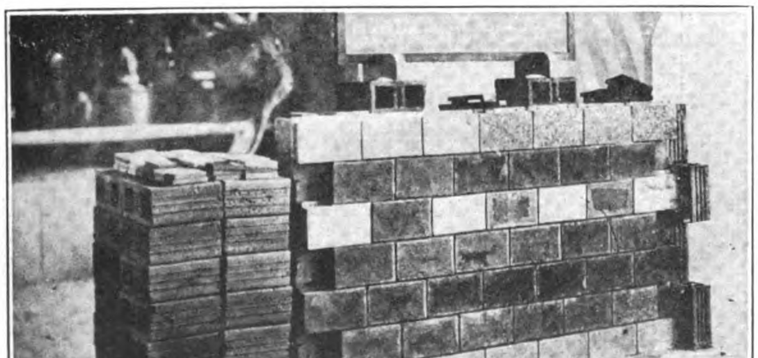
Steel Transmission Towers, Boiler Tubes, etc.



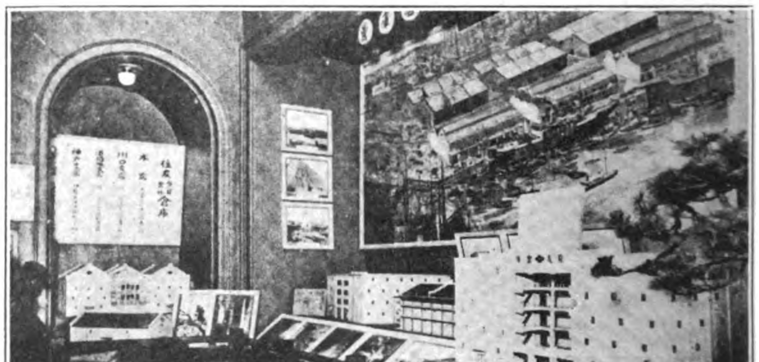
Precision Tools, Lathes, Copper and Brass Rods, Tubes, etc.



Copper Wire, Insulated and Armoured Cables, etc.



Hollow Tiles



Warehouse Exhibit, showing models of new Warehouses under Construction in Osaka

All warehouses are first-class brick of fireproof concrete buildings, safely and conveniently situated. The business enjoys unparalleled prestige,

Its Kobe and Kawaguchi branches are largely given up to bonded and private warehouses for the Kobe and Osaka customs houses. It has recently established its own warehouses near the

Sumitomo Head Office and Bank, Osaka

Osaka harbor pier in order to facilitate storing or re-packing imported and exported goods. The stocks in warehouses at the end of May 1922, were valued at Y.80,430,930.

The branch warehouses are: (1) Kawaguchi branch in Kita-ku Osaka; (2) Dotombori branch, Nishi-Ku, Osaka; Kobe branch and the Tokyo branch.

Sumitomo Copper Works

AJIKAWA, OSAKA

Mr. J. Matsumoto, *General Manager.*
Mr. I. Fujimoto, *Manager.*

The Works, established in 1897, covers 13.61 acres, 6.66 acres of which is occupied with sheds and shops and employs 3,700 hands.

The Works are divided into six departments :—

(1) Foundries; (2) Sheet and Plate Mill; (3) Tube Mill; (4) Bar Mill; (5) Steel Tube Mill; (6) Testing Department.

1. FOUNDRIES.—The foundries supply the shops with various ingots. Long experience on the part of the skilled staff enable the Works to depend on reliable materials for its products.

2. SHEET AND PLATE MILL.—The Mill turns out sheets and plates of copper, zinc, brass, yellow metal, naval brass, manganese bronze, phosphor bronze, aluminium, German-silver and many other metals. It has an up-to-date and improved mechanical equipment which is laid out on such a scheme and plan as to ensure economy in working. It produces all kinds and sizes of sheet and plate for all purposes furnished in hot or cold rolling process. Heavier plates for locomotive and marine engines are also rolled.

3. TUBE MILL.—The Mill is the pride of the Works. Its manufacturing facilities are not only of dimensions that have no rival in Japan but rank among the best mills of the world. Refinements of technique have been achieved; intricacies in engineering have been mastered; and a special process has been invented and installed with no small success. The seamless tubes there made are light in weight and are strong against breakage. The copper, and condenser tubes are approved by the imperial Japanese navy.

4. BAR MILL.—The Mill is well furnished for the production of bars, rods and other metal of various forms and shapes to order. They are finished exact to required size and shape with a perfectly smooth surface free from cracks, spills or any other defects.

Blading materials for steam turbines were produced at the Works' mill for the first time in Japan about six years ago. Since that date, with much effort and endeavor the Mill has succeeded in originating and adopted a special process of production which has enhanced its business.

5. STEEL TUBE MILL.—For seamless tubes, the Mill is equipped with its own process of manufacturing, by which means steel bloom is first pierced, rolled and drawn to the length and diameter required. The tubes are finished into a uniform thickness, and perfectly smooth both inside and outside throughout the whole length. The consequent absence of longitudinal seams makes the tubes very strong and durable. They are supplied to the Imperial Japanese navy, railways and private shipyards.

6. TESTING DEPARTMENT.—To reinforce the expensive factory equipment, the Works has a well-equipped chemical and physical laboratory where all the problems incident to the solution of every difficulty encountered are handled by thoroughly reliable experts and by modern methods. All raw materials are tested and inspected here, before they are sent out to each mill. With these facilities at its disposal, the Works is enabled to meet the severest specifications and to give to the users of its products a standard of quality that always ensures their entire satisfaction.

Sumitomo Electric Wire and Cable Works, Ltd.

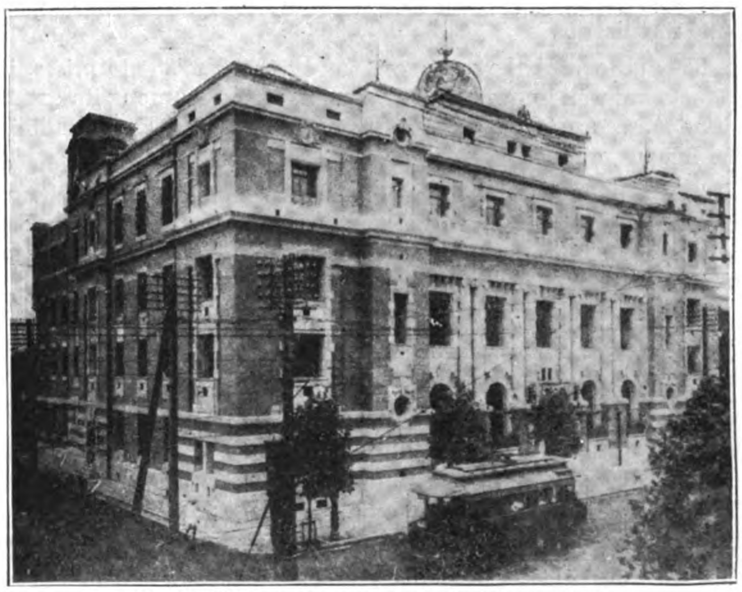
OKIJIMA, OSAKA

Managing Directors: Messrs. Yasuo Riko, Dr. Eng., and Denichiro Nishizaki.

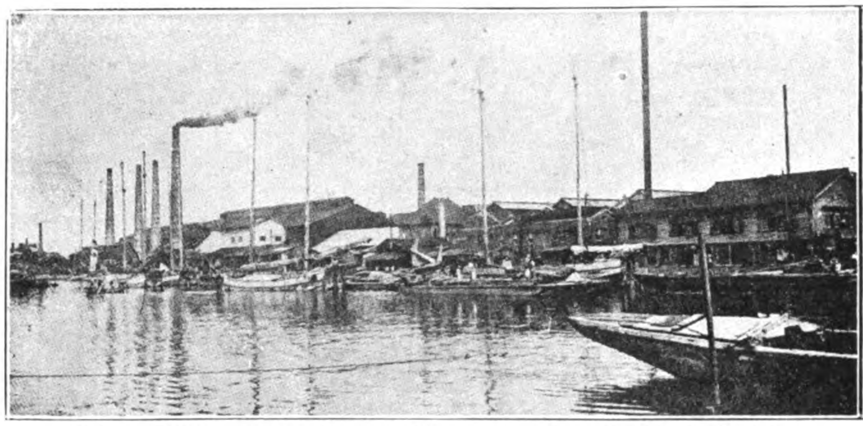
The Sumitomo Electric Wire and Cable Works is in itself the most efficiently equipped electric wire and cable factory, east of Suez. Though its history is a comparatively new one, for it was first established in 1908, the Works, controlled by experienced hands, has turned out the first paper cable made in Japan.

Since that date, in every branch of electrical engineering, great changes and advances have taken place only to be accompanied by a corresponding growth in the manufacturing facility of the Works. In its present buildings, which have been occupied three years, modern and up-to-date improvements in the manufacture of all sorts of wires, bare and insulated, have been invented and are in use. In fact, it is the only Works in the line where the system of "standardized production" has been introduced with great economy in the cost of production,—a fact which is demonstrated by its prosperity, and is well endorsed by the general satisfaction and appreciation shown with regard to its standard of quality in the markets, at home and abroad.

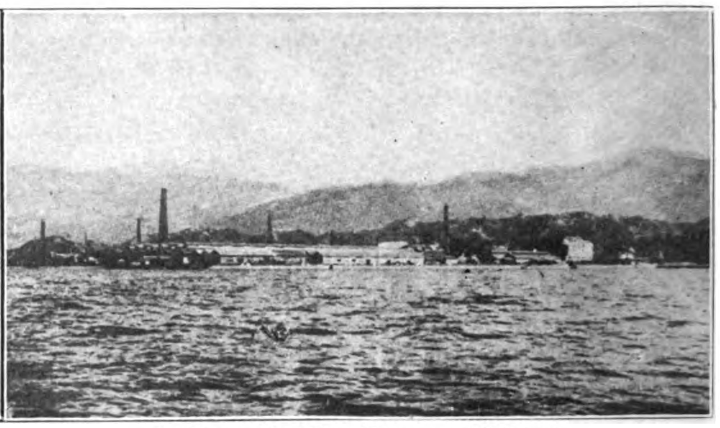
Its scope of manufactures ranges from bare wire and cable to all kinds of insulated conductors.



The New Tokyo Branch of the Sumitomo Bank



Amagasaki Branch Works, for making wire nails and galvanized wire.



Sumitomo Fertilizer Factory at Niihama

1. BARE WIRES AND CABLES.—Plain or tinned, hard- and soft-drawn, copper wires. Copper tapes and bars. Round or grooved trolley wires. Brass, silicon and phosphor bronze wires. Aluminium wires. German-silver wires. Stranded wires of every description.

2. INSULATED WIRES AND CABLES.—(*a*) Rubber insulated wires and cables; electric-light, power, telephone and telegraph wires and cables; (*b*) paper insulated cables; underground power cables, dry-core and telephone and telegraph cables; (*c*) varnished-cambric insulated cables; (*d*) cotton and silk-covered wires; all kinds of instrument wires, weather-proof aerial wires and cables; (*e*) lighting flexibles; (*f*) paraffined wires; (*g*) vulcanized bitumen cables; (*h*) enamelled wires.

3. CABLE ACCESSORIES.—The rapidity with which the plant and business have evolved finds hardly a parallel elsewhere. The number of the workmen employed in 1911 was no more than 180, which has been increased at a bound to 2,000 during these six years. Its sphere of business activity now includes India, Java, Australia, Russia, China, Italy, Canada, etc.

Sumitomo Fertilizer Manufactory

NIIHAMA, IYO

Mr. Kamajiro Kajiura, *Manager*.

The manufactory covers 20 acres, 7 acres out of which is covered with various shops and store-houses.

Its manufactures are; (1) Sulphuric acid; (2) nitric acid; (3) superphosphate; (4) compound manure; (5) complete manure.

The annual output is about 12,000,000 *kwan* of sulphuric acid; 2,000,000 bags of super-phosphate; 1,000,000 bags of compound fertilizers.

Though one of the youngest among the firm's enterprises, its products are well known in all eastern markets. Among its export markets are Australia, India, South Sea Islands, Russia, Philippine Islands, etc.

The equipment of the plant has been chosen out of many European improved patterns. To reinforce this matchless factory, the firm's Besshi Mine offers abundant pyrite for manufacturing different kinds of fertilizer of superior quality. Pyrite from the copper mine enables the factory to produce more phosphate than any other chemical fertilizer works in Japan.

Sumitomo Steel Works, Limited

SHIMAYA-CHO, OSAKA

Baron Kichizaemon Sumitomo, president; K. Nakada, chairman of the board; J. Matsumoto, managing director; T. Sumitomo, M. Suzuki, K. Yukawa and S. Kato, directors; S. Kato and J. Kawada, managers,

The Sumitomo Steel Works was the first to set up in Japan in its line of business, producing steel castings with one 15-ton acid process; steel forging with four basic Siemen's furnaces, the total capacity being 68 tons and with hydraulic presses 2,000 tons, 1,600 tons and 600 tons respectively. Its products comprise:

1. Case steel crossings, turns, wheels, etc., for railways, collieries, mines, etc.

2. All of essential parts of marine boilers and engines, propellers, propeller-blades, anchors, marine steering gears and all sorts of things for ships and steamers.

3. Rollers for iron, copper and brass mills.
4. Hydraulic cylinders, etc.
5. Yokes for electric dynamoes, etc.
6. Gearings with straight or helical teeth.
7. Dredgers, buckets, etc.
8. All machinery parts that require the strongest strain.

All these products of the Works have Lloyd's certificate for reliable quality, and many other awards of merits conferred at the various exhibitions, both at home and abroad. A factory for steel rollings is now under construction. Annual melting capacity of the Siemens-Martin furnace is 20,000 tons of acid and 20,000 tons of basic steel.

The Sumitomo Bank, Ltd. (Successors to the Sumitomo Bank)

Head Office: Kitahama, Osaka.

Capital: Y.70,000,000; Paid up: Y.40,000,000; Reserve: Y.12,000,000.

Officers and Directors: Baron K. Sumitomo, president; Messrs. K. Yukawa, T. Kanoh, S. Yoshida and N. Yatsushiro, managing directors; M. Suzuki, K. Nakada and K. Hori, directors; T. Hamazaki, manager, head office. Chief shareholders: Baron K. Sumitomo, 153,720; Messrs. M. Sumitomo, 18,000; A. Sumitomo, 5,400; K. Sumitomo, 5,400; K. Sumitomo, 3,000; M. Suzuki, 2,500 and T. Sumitomo, 2,000.

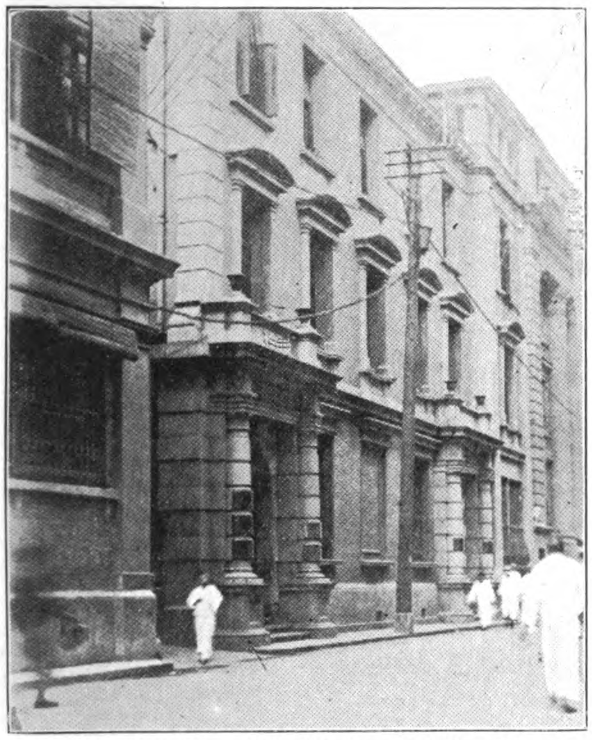
HISTORY.—Established in March, 1912. The Sumitomo Bank, one of the largest commercial and exchange banks of Japan, can be said, in a broad sense, to be older by four years than the Bank of England, having as its origin the Sumitomo firm, established in 1690. In its early days, the Sumitomo firm advanced loans to the Daimoyos under the Shogunate, and merchants of the city of Osaka which was then gaining its prominent position as the centre of commercial and industrial Japan. In 1895, the firm organized its old general financial business into a modern banking system with a capital of one million yen under the title of "Sumitomo Bank." Since December 31st, 1895, the bank has made steady progress, as may be seen from a statement on next page.

Dec. 31st	Deposit.	Loans.	Reserves.
1895 ..	Y. 882,000	Y. 2,142,000	Y. —
1899 ..	7,486,000	8,164,000	850,000
1903 ..	19,468,000	16,220,000	1,950,000
1907 ..	32,596,000	26,539,000	3,400,000
1911 ..	44,348,000	35,391,000	4,800,000

The private bank was converted into The Sumitomo Bank, Ltd., in April, 1912.

Dec. 31st	Deposit.	Loans.	Reserves.
1912 ..	Y. 51,937,000	Y. 43,909,000	Y. 200,000
1915 ..	86,123,000	75,014,000	1,100,000
1917 ..	187,620,000	163,677,000	2,100,000
1918 ..	269,250,000	251,700,000	4,100,000
1919 ..	348,359,000	345,582,000	6,500,000
1920 (Jan. 30th)	359,764,000	375,155,000	12,000,000

Many important branches were established, and the foreign exchange department opened in 1905, with numerous correspondents in the principal centres of the world. In 1912, it was incorporated as a joint stock company and its capital brought up to Y.15,000,000, the greater part being subscribed by the Sumitomo family. In July, 1917, the capital was further increased to Y.15,000,000 and in April, 1920, another increase to Y.40,000,000 was decided on, and public subscription invited, with great success each time. At present, with a capital of Y.70,000,000 and 2,327 shareholders it occupies a foremost position in the banking system in Japan, with branches in London, New York, Shanghai, Honolulu, Seattle, etc.



Shanghai Office of the Sumitomo Bank and Sumitomo Goshi Kaisha

China Offices

Distributing and sales offices for the Sumitomo products in Central China were opened in Shanghai in November 1916. Since then this office has taken over the agency of the Fuso Marine and Fire Insurance Company and handles the Sumitomo investments in Chinese industrial and mining enterprises. This office is under the direction of Mr. C. Fukuda. A fine new building has since been erected in Kiukiang Road in the heart of the business district which houses the Sumitomo Bank and the commercial departments. A Tientsin branch is maintained at 42 Rue du 14 Juiellet under the management of Mr. S. Sakamoto and one at Hankow directed by Mr. T. Kubota.

Yangtze Commission

Preparing for Mr. Palmer's Visit

Mr. George G. Stroebe has been engaged by the technical committee of the Yangtze river commission to survey the Yangtze River preparatory to the improvement of this great waterway of China. A party consisting of Mr. van der Veen, a member of the committee, Mr. T. C. Shoung, chief secretary of the commission, and Mr. Stroebe, in the capacity of the chief survey engineer, left Peking for Hankow to make a study of the river. They will go down the river from Hankow to Shanghai, and at Nanking will be joined by Mr. Yang Pao-ling, another member of the committee.

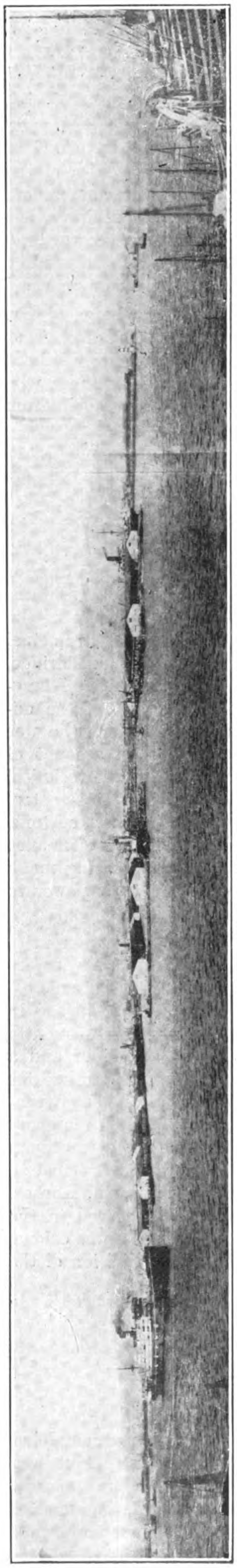
An office will be established at Shanghai, in charge of Mr. Stroebe, to carry on the survey work, and the head office is at Peking. After sufficient hydrologic data have been collected about the river, Mr. F. Palmer, the world-known hydraulic engineer, who made a trip to this country last year, will come out again from England to study the river and give his expert opinion with regard to the improvement of it. The importance of collecting enough data upon which a comprehensive scheme of improvement can safely be based is generally admitted.

The technical committee of the commission under which the survey work will be undertaken was organized in May. Its members are Mr. H. van der Veen, adviser to the ministries of the interior and communications; Mr. Yang Pao-ling, a well-known Chinese hydraulic engineer; Mr. H. von Heidenstam, chief engineer of the Huangpu conservancy board; Mr. Chow Zian-yien, principal technical expert of the ministry of the interior; Capt. T. J. Eldridge, customs coast inspector; Mr. Sun Ping-wang, chief of the Kianghuai surveying bureau; and Mr. Chen Shih-li, chief of the engineering department of the ministry of the interior, who was unanimously elected chairman of the committee on account of his experience and seniority. All of these members are technical men of recognized ability. Sir Francis Aglen, inspector-general of customs, Mr. Sun Pao-chi, director-general of the customs administration, and Mr. Kao Ling-wei, former minister of finance and minister of the interior, have given the undertaking much encouragement, and have done everything within their power to make it a success.

Mr. Stroebe has been in the Philippines government service for more than 12 years as hydraulic engineer, in which capacity he designed irrigation, river and harbor works, and a municipal water supply. He graduated from the University of Chicago in 1900 and the University of Michigan in 1904, and subsequently taught civil engineering in the latter university for four and a half years. Before going to the Philippine Island he worked for the United States reclamation service, which does all the government irrigation work, and also for the Canadian British Company as bridge designer. When the United States declared war upon Germany, Mr. Stroebe enlisted immediately and was assigned to the engineer officers' training school at Fort Leavenworth, Kansas. He was commissioned captain of engineers, and served in the Philippine Islands, where, at the close of the war, he was colonel of the regiment of engineers of the first Philippine division of the United States army.

Japan to Make Tin Plate

The Imperial Steel Works at Yawata, Japan, has completed construction of its plant for making tin plate. This plant was erected with a view to checking imports of tin plate from America. Its estimated annual capacity is 20,000 tons, although, Commercial Attaché James F. Abbott reports from Tokyo, the first year's production is not expected to exceed 6,000 tons.



View of Kobe Harbor Improvements taken from Harbor

Port of Kobe Improvements

By K. Morigaki, Chief Engineer

THE port of Kobe (Hyogo harbor) is situated in the southwestern part of Settsu province twenty miles from Osaka and embraces Kobe and Hyogo bays. It faces south and is sheltered on the north by the Rokko mountain range which rises two miles from the coast. In olden days Kobe was a straggling fishing village, but after the building of the Osaka castle in 1583 (the 11th year of Tensho) by Toyotomi Hideyoshi it grew in importance as a distributing centre.

On the 7th of October, 1867 (3rd year of Keio), the opening of Hyogo harbor for foreign trade was sanctioned by imperial decree, and in the following year, 1868 (the first year of Meiji), two Unjosho (excise offices), east and west, were established, and four piers and three warehouses, were constructed constituting the first accommodations for foreign trade in Kobe.

In 1873 (the 6th year of Meiji) the Unjosho were renamed, "The Customs." Since that time the wharves, piers, warehouses and sheds have been improved and added to year by year. By 1901 (the 34th year of Meiji) eight warehouses, fourteen sheds and nine cranes had been erected on Wharves No. 1 and 2 and the Onohama wharf. In addition, Kawasaki, Hyogo and No. 4 wharves had received noticeable improvements. The following year, 1902 (the 35th year of Meiji), the two breakwaters, one 600-ft. long to the east and the other 660-ft. long to the west, off Onohama, were completed.

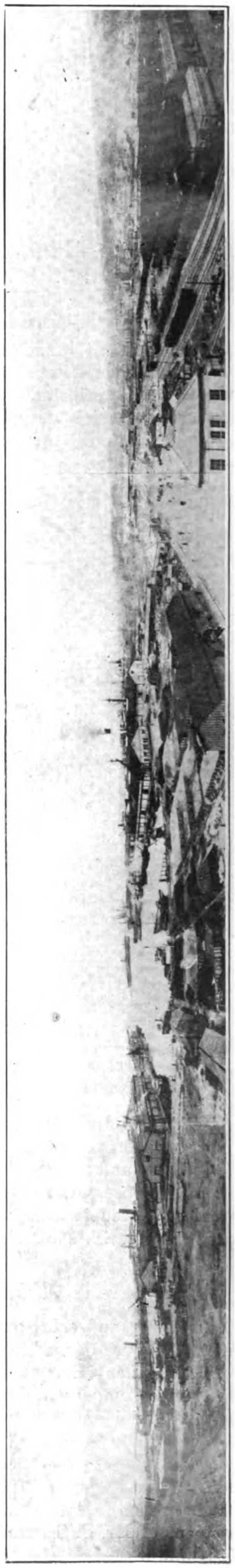
Foreign trade in Kobe has developed by leaps and bounds and at present Kobe is universally regarded as one of the largest trading ports in the Far East. The following table shows the progress of Kobe trade every fifth year since 1873 :—

Exports and Imports

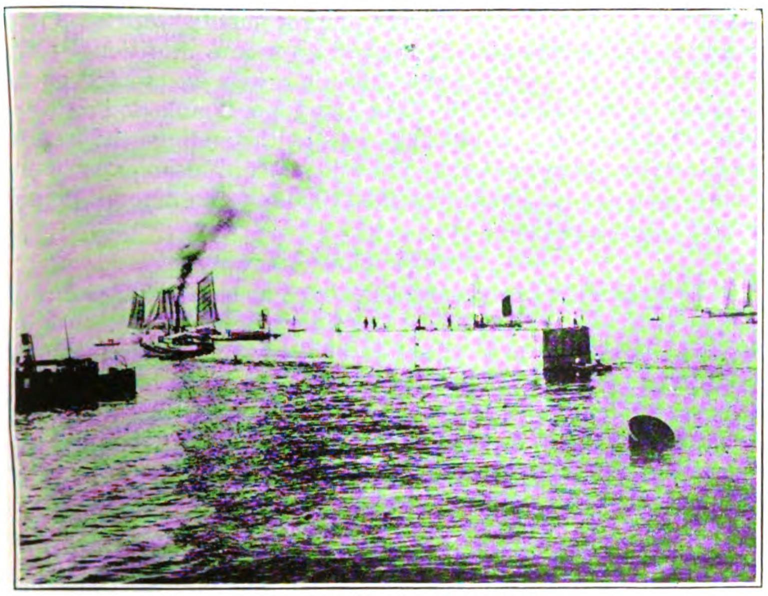
Year		Values of Exports and Imports	Increase compared with previous year	Percentage increase
		Yen	Yen	Bales
1873	..	8,441,869	—	—
1878	..	12,531,535	4,089,666	85
1883	..	12,961,841	430,306	3
1888	..	42,971,975	30,010,134	211
1893	..	66,263,250	23,291,275	54
1898	..	198,253,442	131,990,192	191
1903	..	245,052,228	46,798,786	24
1908	..	275,195,639	30,143,411	12
1913	..	522,727,527	247,231,883	14
1918	..	1,352,482,464	830,054,937	32

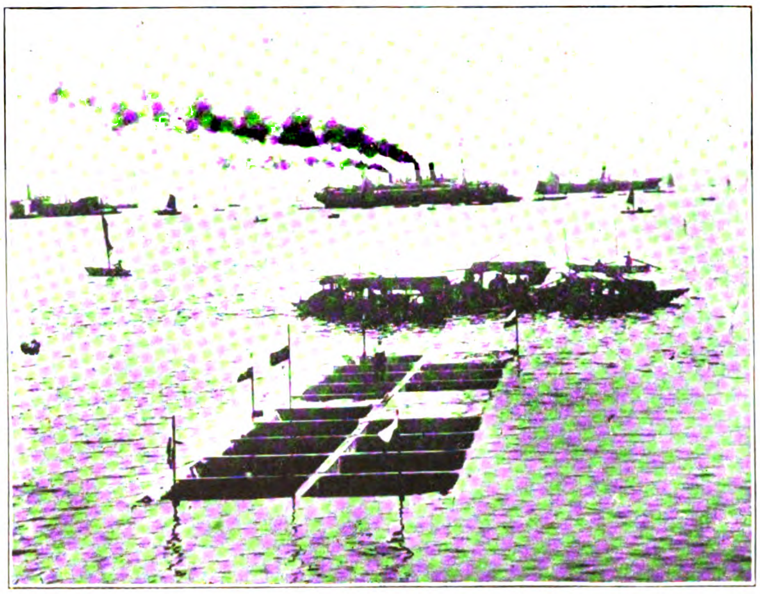
From the above it will be seen that the rate of progress of exports and imports combined, at the end of every fifth year, shows an average increase of about seventy per cent.

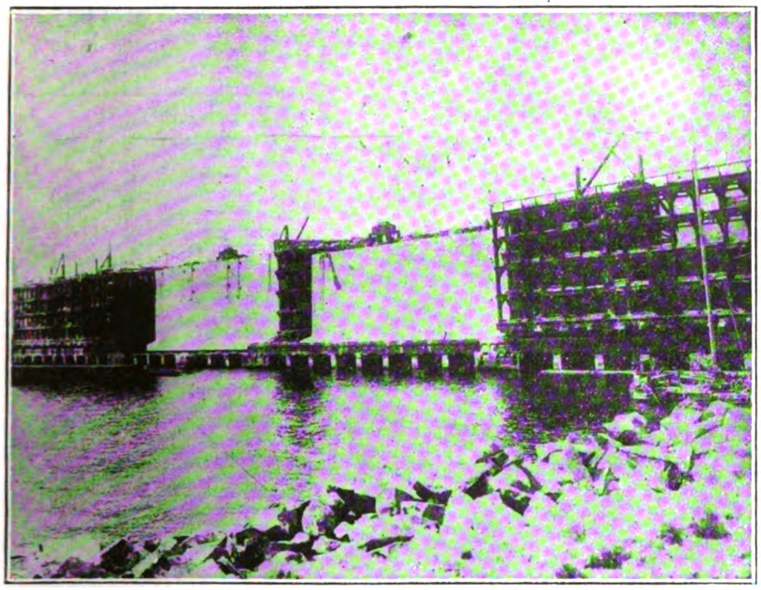
The prevailing wind of the port comes from the north, but because of the shelter afforded by the Rokko range of mountains, it does not interfere with shipping in the harbor. In winter westerly winds sometimes visit the port but owing to the geographical position of Wada point they are not harmful. However, during the summer months southerly and easterly winds visit the port and these winds sweeping over the large expanse of open water between Kobe and Osaka frequently cause damage to the small craft in the bay. In spite of this, records show that operations in the harbor are never suspended, owing to rough water, more than twenty times during a year.

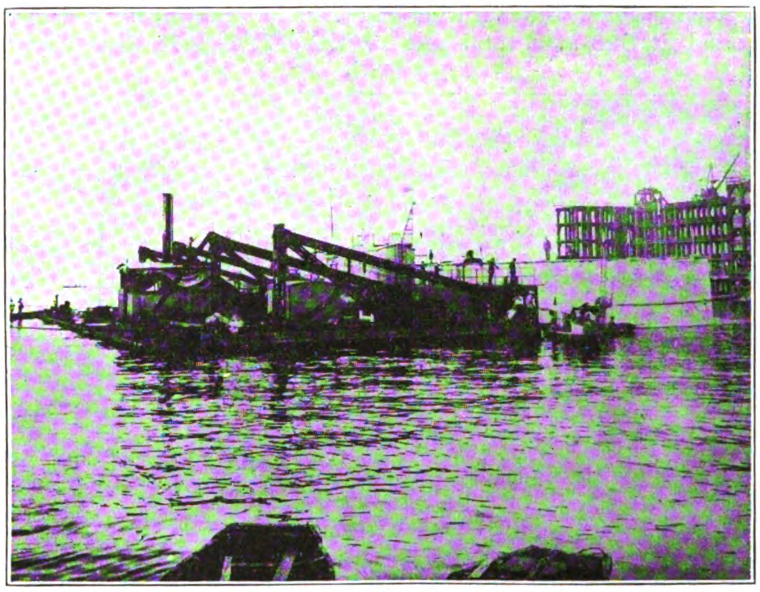


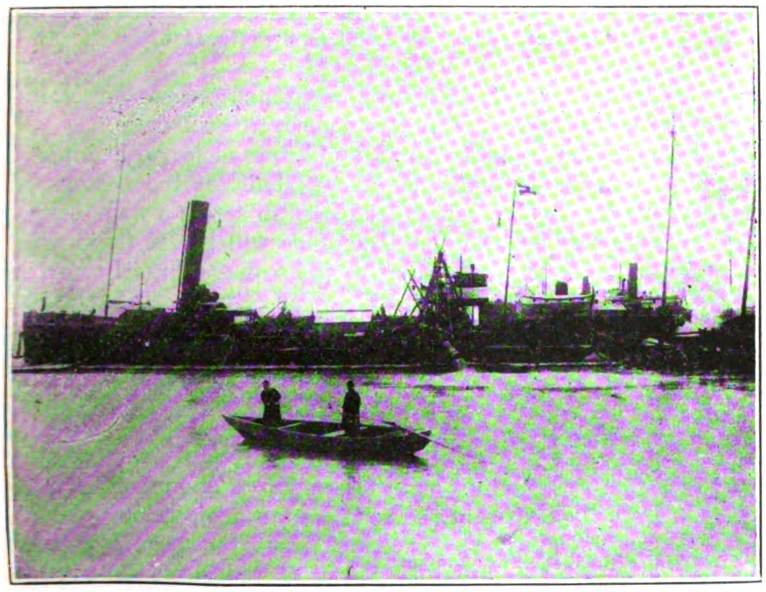
View of Improvements from Customs Compound

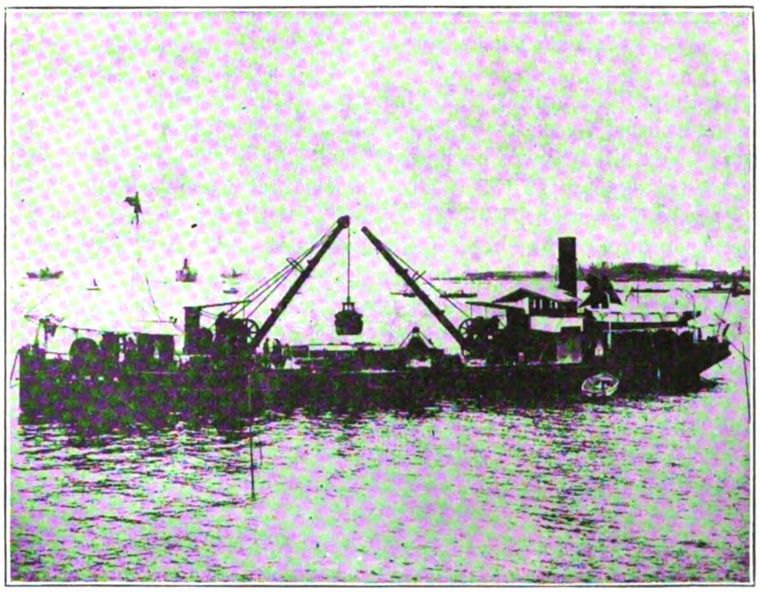

Caisson Towed to its Site


Caisson Being Deposited


Ferro-Concrete Caisson on the Casting Pier


Caisson Leaving the Depositing Dock


Sand Pump Dredger "Dokai Maru" at Work


Priestman Dredger "Owada Maru" at Work

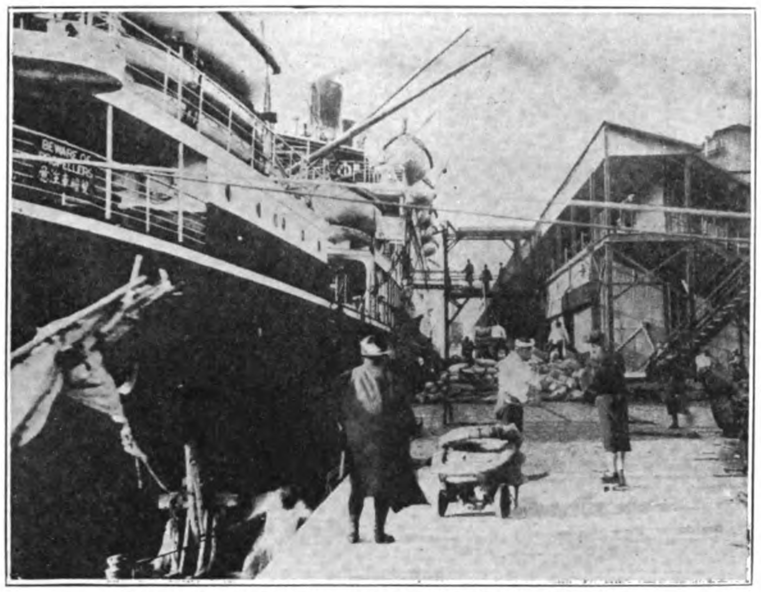
The harbor which is deep with a slightly slanting bed has no stream carrying alluvial deposits into the harbor and consequently the bottom, consisting of mud and sand, affords a very safe anchorage. Kobe harbor itself is ideal from point of location, but because of the sudden tradal expansion of the port, the piers and terminals were soon found to be inadequate.

As a temporary measure to meet this sudden and rapid development of the port, plans were drawn up for a mole and a steel pier

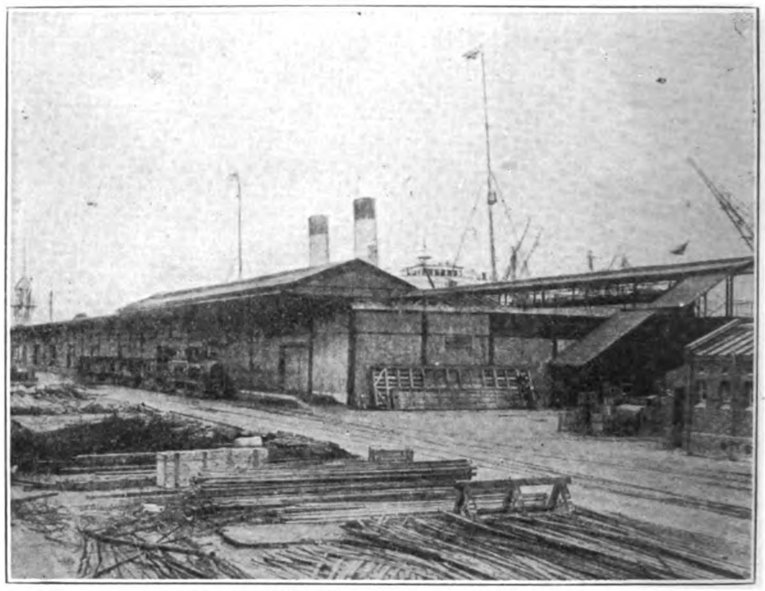
at Onohama to be built in six years at an estimated cost of Yen 3,960,000. In April 1906 (the 39th year of Meiji) work on this project was started under the supervision of the construction bureau of the department of finance. However, as these tentative plans were insufficient to meet the requirements of the increasing trade of the port, further changes were made for the improvement and extension of the harbor.

In September. 1906 (the 39th year of Meiji) Mr. Sakatani, the minister of finance, came from Tokyo and suggested a general plan of improvement. The city of Kobe being aware of the wonderful opportunities saw the necessity of these improvements and volunteered to bear a portion of the expenses incurred. The original plan of 1906 was altered to reclaim the foreshore from the projection of Onohama on the east, to the front of the former foreign concession on the west, providing thereby accommodations for the handling of 4,000,000 tons of cargo per annum. The plan also provided for the most modern improvements of facilities for the handling of sea and rail traffic between Kobe and Hyogo. The original estimated cost was to be increased to Yen 28,905,145, by a supplementary budget and in March, 1907, the plan was revised to divide the work into two sections.

First Section.—Being most urgently required it was decided to construct first, the four wharves on the foreshore of the reclaimed ground at Ono at a total cost of Yen 17,099,407, with accommodations for handling 2,100,000 tons of cargo per annum and to be completed in eight years. This estimate (Yen 17,099,407 of which Yen 437,907 was borne by the city of Kobe) was the amount increased by Yen 13,139,407 to the original estimate (Yen 3,960,000). In September, 1907 (40th year of Meiji) elaborate commencement ceremonies were held at No. 1 mole attended by Mr. Sakatani, the minister of finance. From that time the work proceeded satisfactorily but it became necessary to extend the period in which these improvements were to be completed, and the scheme was modified. This was found necessary owing to the general advance in prices as a result of the great world war, and it was decided to complete the work in sixteen years, i.e., from the 39th year of Meiji to the 10th year of Taisho, at a total estimated cost of Yen 15,092,037 of which Yen 3,669,802 was to be borne by the city of Kobe.



Steamer Discharging at "A" Shed, Pier No. 1.



Eastern Side of "A" Shed, Pier No. 11.

As a result of the war, exports and imports in Kobe increased suddenly, and consequently at the beginning of the 6th year of Taisho there was great need for government warehouses as well as private warehouses for storing imported goods. Lack of landing space made it difficult to land goods which had been discharged into lighters and the wharves became badly congested. This was of great inconvenience to importers and exporters but fortunately a completed portion of the harbor improvements were soon used to relieve the congestion. Moreover, to secure additional relief, temporary sheds covering 6,006 *tsubo* in area were erected on the reclaimed ground between No. 1 mole and No. 2 mole and on No. 3 mole at a cost of Yen 180,000. Notwithstanding the serious congestion on the wharves, by the 9th year of Taisho exports and imports amounted to more than 2,000,000 tons, an amount greatly beyond all expectation.

1 *tsubo* = 1 *ken* sq. 1 *ken* = 2 yards.

The harbor improvements called for in the first section of the program were completed by the 10th year of Taisho. During this time there was a revision of the government organization. On the first of June, 2nd year of Taisho, the Kobe branch of the construction bureau of the finance department was abolished, and after that all the improvements were carried out under the supervision of Kobe branch of the construction section of the secretary's department of the finance minister.

2. Outline of Reclamation and Construction

Prior to the construction of the landing pier at Onohama, additional accommodations for storing imported goods were started at Kawasaki customs compound in 1906. Nine wooden sheds, covering an area of 3,330 *tsubo*, were built, as well as temporary office, numerous roads and wooden piers. Two years later, the eastern portion of No. 1 Hatoba or western customs was reclaimed and two wooden sheds were built which covered 525 *tsubo*.

The modified project was to build four moles with intervals of 480-ft. and 540-ft. The mole to be built at the eastern extremity was one, whose eastern side was to act as a wave-breaker and its inner side as a quay. This mole will be 180-ft. in width and 1,290-ft. in length, while the others to have a nearly uniform length of 1,200-ft. and width of 336-ft. respectively. The reclaimed foreshore was to extend from the headline at Onohama on the east to the front of the former concession on the west, and it was necessary to fill in the sea which was about 20-ft. deep where the four moles were to project.

Reclamation.—The reclamation work was commenced in 1907 and completed in 1921 at an expense of approximately Yen 518,858. The total area of the reclaimed ground, including moles, covers about 65 acres and is 11-ft. above the mean low water spring tide. (Sand pump and Priestman dredgers constituted the main floating equipment for the work.)

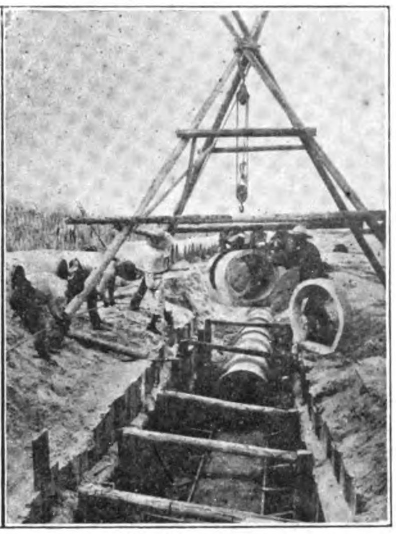
Dredging.—The total dredged area covers about 270 acres between and in front of the moles, depth of dredging varying from 30 to 36-ft. below M.L.W. level, according to the depth of the quay walls.

Depth of the space between Moles No. 1 and No. 2 Northern part. 33-ft. below L.W.L.
Depth of the space between Moles No. 1 and No. 2 Southern part. 36-ft. below L.W.L.
Depth of the space between Moles No. 2 and No. 3. 30-ft. below L.W.L.
Depth of the space between Moles No. 3 and No. 4. 30-ft. below L.W.L.
Depth of the western part of Mole No. 4 and general fairway. 30-ft. below L.W.L.
Depth of the fairway in front of No. 1 mole and No. 2 mole. 36-ft. below L.W.L.

Of the mud obtained by dredging, amounting to about 318,740 *tsubo*, sixty per cent. was utilized for the lower layer of the reclaimed ground, sand being deposited on the upper part.

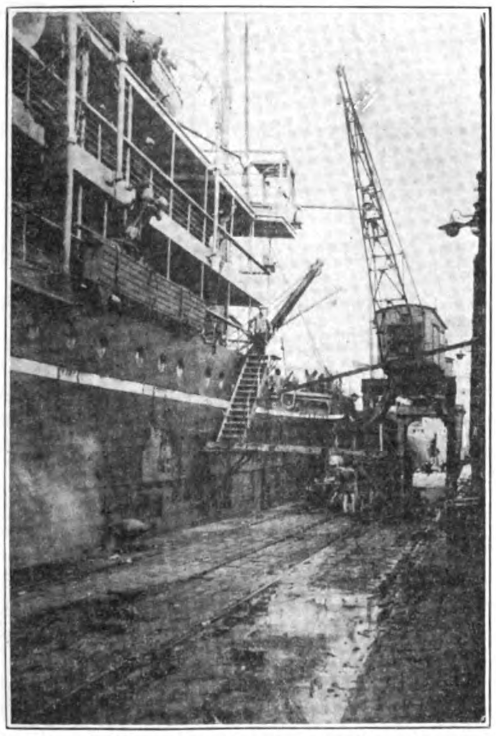
Dredging was commenced in 1909 and completed in 1918 at an expense of about Yen 221,531. (Priestman type dredgers were chiefly used in this work).

Steam Rollers at Work on New Road



Laying the Main Sewer Pipes

Lighter Wharves and Sea Walls.—No. 1 lighter wharf is 258 yds. in length and No. 2 and No. 3 wharves are 160 yds. and 180 yds. respectively, all of which were built upon concrete blocks piled on a rip-rap foundation. Numbers 1 and 2 wharves have upward slope, from a height of 7.5-ft. above L.W.L. up to the edge of the reclaimed ground in order to facilitate the handling of cargo by hand to and from lighters. The foreshore between Moles No. 2 and No. 3 was constructed with a steep slant in order that the charging and discharging of lighters could be done by cranes. Steel stairs, steam portable or hand fixed cranes together with numerous bits and rings were installed on all the wharves. These are available for mooring lighters and launches drawing about 9-ft. of water. The wharves were commenced in 1908 and completed in 1922, costing nearly Yen 263,635. The eastern side of No. 1 mole, which was built as a sea wall, is about 706 yds. long and was built of concrete blocks upon a rubble mound. This wall is 17-ft. above L.W. L. The work was started in 1907 and finished in 1914 at an expense of Yen 408,759.



Electric Traveling Crane unloading Cargo from Steamer

Electric Traveling Crane loading Cargo into Lighters

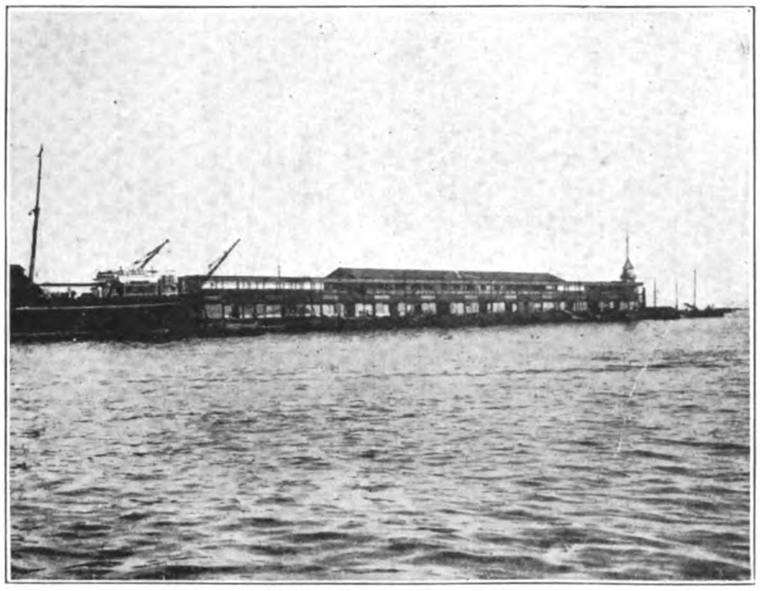
Quay Walls.—The total length of the quay walls is about 9,556-ft. with 8,172-ft. available as follows :

Quay	Height of Walls	Depth of Water below L.W.L. Level	Effective Length	Number of Ships Alongside
No. 1 mole southern part	47-ft.	36-ft.	780-t.	1
No. 2 mole east side southern part ..	47 ,,	36 ,,	780 ,,	1
No. 1 mole northern part	44 ,,	36 ,,	462 ,,	1
No. 2 mole east side northern part ..	44 ,,	33 ,,	390 ,,	1
No. 2 mole western side	44 ,,	33 ,,	1,134 ,,	3
No. 3 mole and No. 4 mole	41 ,,	30 ,,	4,626 ,,	12
Total ..	..	.. ..	8,172 ,,	19

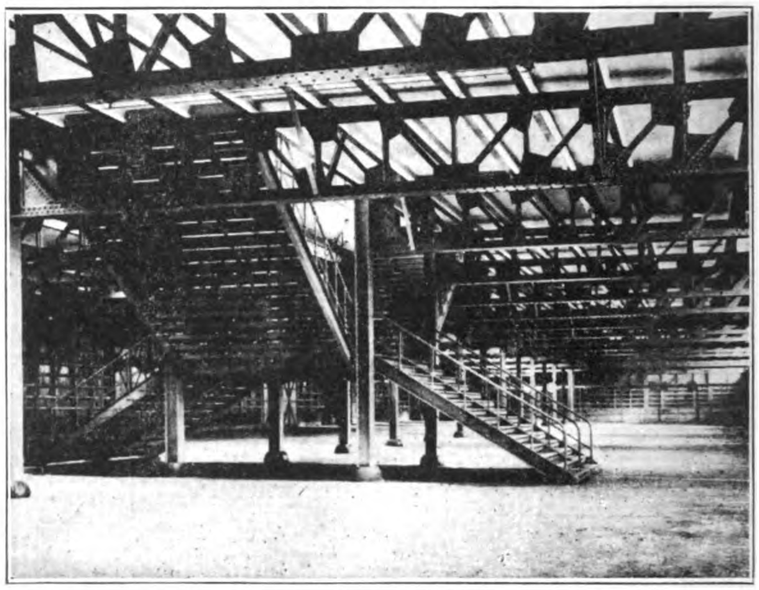
Presuming that 250 tons of cargo per foot were handled per annum, the total accommodations of the quays for loading and unloading cargo would be 2,100,000 tons per annum. Nineteen vessels can be moored alongside the quay walls at one time.

The sea bottom consists of soft mud to a depth of 6 or 7 ft. with layers of fine sand or hard clay underneath, but as a whole it lacks uniformity of strata, which fact caused serious inconveniences when putting down the foundations of the quay walls. After careful consideration, it was decided to construct a series of ferro-concrete caissons, the idea being to simplify the work of erection and to distribute the load over as broad as possible. Caissons were prepared beforehand on shore, towed to and deposited on their site, after which they were filled with concrete and sand. At the commencement of the operations the bottom was carefully tested to determine to what depth it would be necessary to bore to secure a firm bed upon which the caissons could be deposited. It was found necessary to dredge about ten feet to secure a bed which would be sufficiently firm to bear the weight of the caissons required.

In order to build the caissons on shore, comb-shaped wooden piers three blocks long were



"A" Shed from No. 2 Pier



Interior View of "A" Shed

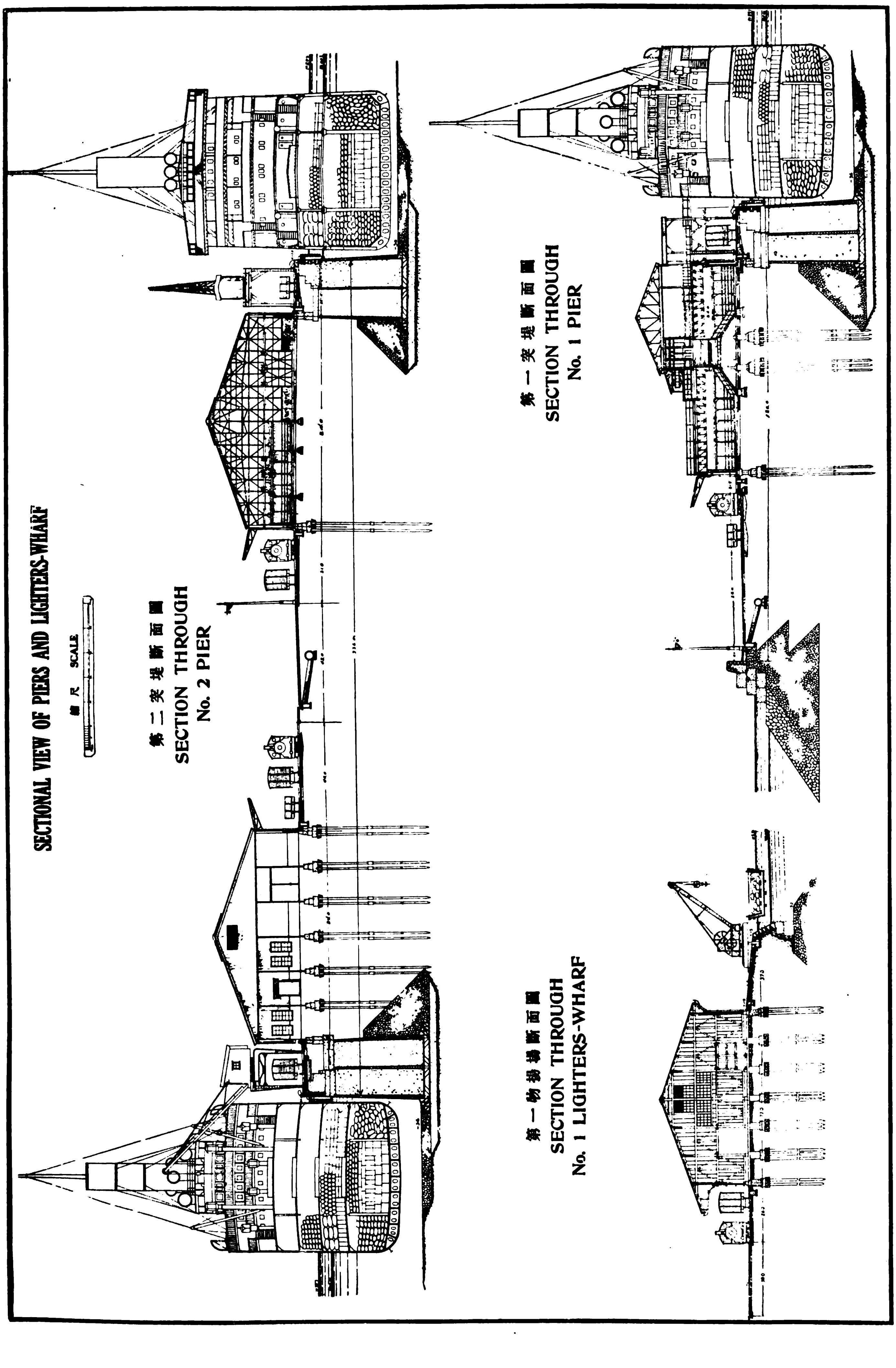
constructed and the caissons were made upon them, after which they were floated by means of a depositing dock which was built at the Kawasaki Dockyard, Kobe, after the design of Messrs. Clark and Standfield of London, England. The dock measured 145-ft. in length, 137-ft. in width and 51-ft. in height. Eight pontoons were attached in a comb-like shape, leaving respectively a space larger than the width of the projections of the above-mentioned piers. To receive the caisson on the pier, the pontoons were pushed into this space. The pontoons were made of steel, oblong in shape, 17-ft. deep, 12-ft. wide and 70-ft. long. Inside the pontoons, were valves for taking in and letting out the sea water, so as to adjust the floating and submersion of the dock. A large outrigger 4-ft. deep, 67-ft. wide and 137-ft. long was fastened to one side of the wall by means of two steel columns and booms. This floated freely on the water to counterbalance the weight of the dock when it was loaded. Upon the side wall, engines and all other equipments were provided to serve as headquarters for the dock operations. According to the depth of the water, different size of caissons were used but most of them were for water of 30-ft. depth. These caissons were 35.5-ft. high and 22.85-ft. wide on the top, and for stability's sake 4-ft. wide and 4-ft. high around the bottom was provided. Both inside and outside walls of the caissons had an inward slant of 1,120, but the two ends were vertical, and from each end a small vertical wall projected to which the adjacent caisson was joined when under the sea. The thickness of the side walls and central longitudinal portions of the walls ranged from 1.5-ft. to 0.675-ft. while 9 partitions were 0.67-ft. at top and 1.22-ft. at the lower part. The interior of the caissons were divided into twenty small chambers. The caissons when in place appeared about 1.5-ft. above water at low tide and a steel water-tight cap specially built for the purpose was placed on top of the walls to cover all four chambers of each caisson. After pumping the water from the two of the front chambers, they were filled with concrete through a cylinder at the top of the cap, and sand was filled into two of the other chambers. Thus when 10 chambers were filled alternately with concrete and sand, the main body of the caisson was completed and formed a unit of the foundation of the quay walls. After the caissons were filled, the masonry and concrete work was built upon them forming the superstructure. Each caisson is 120 feet in length, and ten were required for each side of a mole. When in place, to avoid unequal settlement, a space about six inches was left between caissons, which was later filled in with concrete. The ferro-concrete caisson for 30-ft. depth of water weight about 2,000 tons while those in 33-ft. and 36-ft. of water weighed 2,300 tons. Caissons of the same size were used in 33-ft. and 36-ft. of water but concrete blocks four feet high were placed upon the tops of those in deeper water, to make up the difference. The total number of caissons used for the quay walls were 80, and the operations begun in 1911 was finished in 1918, at a total expenditure of Yen 2,825,400. This expenditure includes mooring posts, bollards, steel rings and staris, for all the quay walls.

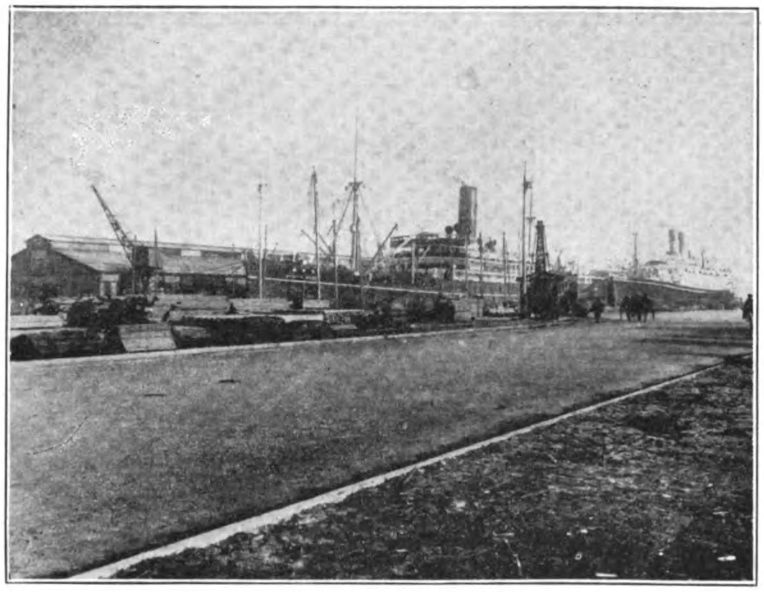
SHEDS.—Sheds were constructed of steel and of wood, totalling in all eighteen. The steel sheds are on the moles, and are used by ocean-going steamers, while the two wooden sheds are for lighters. The steel sheds cover an area of 539,451 sq. ft. each shed measuring from 288 to 540-ft. with a uniform span of 84-ft. The two wooden sheds were built at No. 1 lighter wharf, both with a span of 72-ft. and cover an area of 38,316 sq. ft. The sheds on the moles were built paralled to the quay wall and 23-ft. from the edge. The wooden sheds were built at a distance of 32-ft. from and parallel with the lighter wharves. The particulars of the sheds are follows:

Shed No.		Length ft.	Span ft.	Area sq. ft.	Places where Built
1	Wooden	336	72	24,192	No. 1 lighters wharf.
2	,,	192	72	13,824	do.
A	Steel	540	84	60,147	No. 1 mole.
B	,,	468	,,	39,312	do.
C	,,	504	,,	42,336	East side of No. 2 mole.
D	,,	504	,,	42,336	do.
E	,,	360	,,	30,240	West side of No. 2 mole.
F	,,	288	,,	24,192	do.
G	,,	360	,,	30,240	East side of No. 3 mole.
H	,,	288	,,	24,192	do.
I	,,	504	,,	42,336	West side of No. 3 mole.
J	,,	432	,,	36,288	do.
K	,,	360	,,	40,824	East side of No. 4 mole.
L	,,	288	,,	24,192	do.
M	,,	288	,,	24,192	do.
N	,,	360	,,	30,240	West side of No. 4 mole.
O	,,	288	,,	24,192	do.
P	,,	288	,,	24,192	do.
		16 steel sheds		539,451	
		2 wooden sheds		38,016	
		Total 18 shed.		577,467	

N.B.—The area 60,147 sq. ft. of A shed includes 14,787 sq. ft. of the second story. The area 40,824 sq. ft. of K shed includes 10,404 sq. ft. of second story.

The floors of all the steel sheds are of asphalt and concrete, and those of the wooden sheds of granolithic concrete. The floors of all sheds are the same level as the quay wall, with the exception of the two steel sheds A. and K. These sheds are of special two


SECTIONAL VIEW OF PIERS AND LIGHTERS-WHARF
縮尺 SCALE
第二突堤斷面圖
SECTION THROUGH
No. 2 PIER
第一突堤斷面圖
SECTION THROUGH
No. 1 PIER
第一物揚場斷面圖
SECTION THROUGH
No. 1 LIGHTERS-WHARF



Steamers alongside No. 1 Pier

Lighter Wharf near "Kyobashi"

story construction for the convenience of passengers to and from steamers. On one side of these sheds is a railway platform about two feet high while the other side is the same level as the quay making a slight slope of 1/42. Inside the sheds are electric lights which facilitate the handling of cargo at night. The construction of the sheds was commenced in 1910 and completed in 1921 at a total cost of Yen 2,616,210 of which Yen 65,958 was for the wooden sheds.

RAILWAY.—One line between the steel sheds and quay walls, 2 or 3 lines behind the sheds, and several lines through the reclaimed ground were laid down, according to the Japanese government railway regulations. All these lines are connected with the main line at the Onohama station and are of 3-ft. 6-in. gauge, the total mileage being over 10 miles. 21 turntables (diameter 15-ft. and 14-ft.) and 6 weight-bridges (capacity 30 tons and 24 tons) were provided, and 1.6 miles of broad-gauge rails 13-ft. 6-in. wide for the electric traveling cranes were laid along the quay walls in front of the steel sheds. The operations commenced in 1910 were completed in 1922 at a cost of about Yen 474,221.

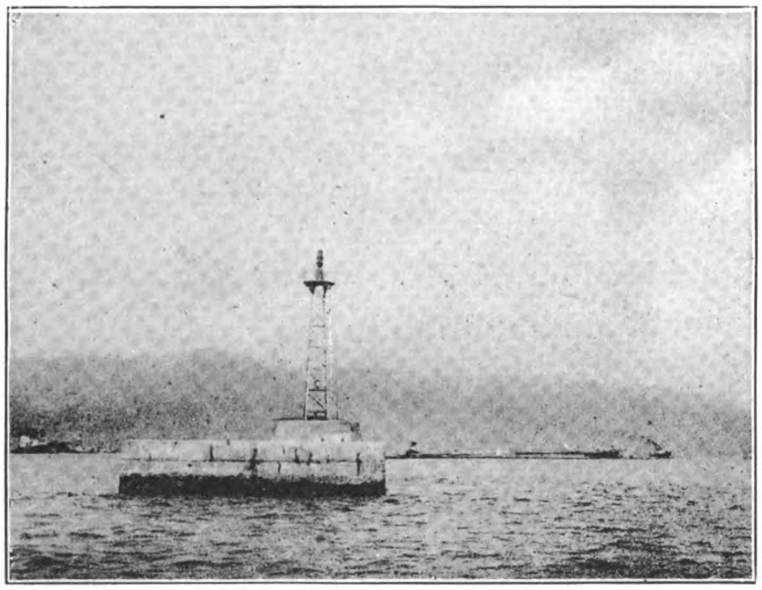
ROADS AND BRIDGES.—Well paved roads of asphalt varying in width from 42-ft. to 72-ft. connect all the moles with the main business section. The total length of the roads is 4,720 yards. On the quays and entrances to all sheds pavings of granite stones were put down. The Kyobashi bridge 66-ft. wide and 66-ft. long, and high enough to allow lighters to pass underneath was built between the north-western part of the reclaimed ground and the main road of the former foreign concession. The operations begun in 1908 and finished in 1922 at a total expenditure of about Yen 837,788.

CRANES.—Each quay has electrically operated traveling cranes of various capacities ranging from 1½ tons to 5 tons.

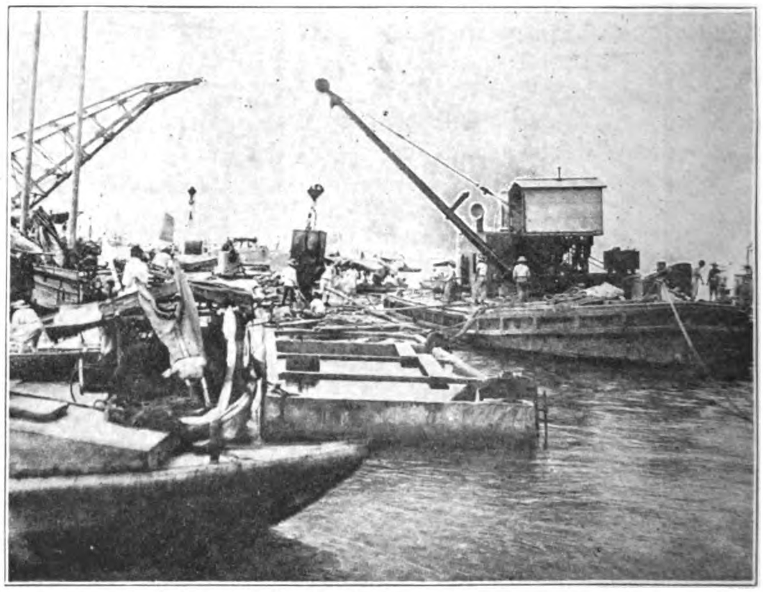
They travel along the quays in front of the sheds and handle cargo directly to and from the hatches. On each side of the quays, two 1½ tons cranes and one 5 tons crane were installed, the total number on the moles being fourteen 1½ tons cranes and seven 5 tons cranes. The electric power is supplied from the generating station of the Kobe city office and is distributed through underground cables by the sub-station in the customs compound. Besides the above-mentioned cranes, one 30 tons and four 5 tons fixed hand cranes in front of the wooden sheds were installed. The first of these cranes was erected in 1908 and the last in 1922. The total expenditure including the cost of the sub-station office amounts to Yen 650,306.

ELECTRIC LIGHT AND WATER SUPPLY.—Electric lights were installed along the roads of the new compound, and electric as well as gas lights were installed along the quays.

Water mains were laid along the quay walls for supplying vessels and underneath the side-walks of the main roads of the customs compound numerous fire hydrants were installed. The work was commenced in 1910 and completed in 1922 at a cost of Yen 182,700.



View of Eastern Breakwater



Eastern Breakwater under Construction

Miscellaneous.—Two powerful tugboats costing Yen 214,-750 (length 100 and 95-ft. width 24-ft. and 23-ft. and depth 12-ft. and 11.5-ft. respectively) were provided for assisting vessels alongside the quays. Two iron foot bridges to be used as passenger gang ways were added as well as a signal tower on the No. 1 mole for displaying berthing signals to vessels entering the port. The total cost of all the miscellaneous accommodations was approximately Yen 142,536.

3. Utilization of the New Accommodations of the Chief Officials

Since October 1913, the completed portions of the new harbor accommodations have been used by the public, and the construction bureau has exerted their best efforts to insure their full utilization. In 1920, the total amount of imports and exports, including intermediate cargo, reached 5,544,000 tons, and 47 per cent. of this amount or 2,066,000 tons passed over the moles, taking advantage thereby of the new facilities. As the original object of the improvements was to provide accommodations and facilities for handling 2,100,000 tons of cargo per annum, it will be seen from the above that even before their completion, this objective amount was nearly realized. From this it will be clearly understood how important the improvement works of Kobe harbor were to foreign trade.

Since January, 1917, the railway facilities connecting the main line system at Onohama station with the custom compound have been in use and in 1920 the total amount of cargo, loaded or unloaded, reached 179,000 tons on 68,000 trucks.

All these works are under the jurisdiction of the construction section of the department of finance, and were carried out by the Kobe branch of the section.

Chief Officials—Head Office (Tokyo)

Director :	K. Yabashi, D.SC.
Business-Controller :	F. Kimoto.
Architect :	T. Chichibu.
Civil Engineer :	H. Inoue.

Branch (Kobe)

Chief :	O. Matsumoto.
Chief Engineer :	K. Morigaki, D.SC.
Architect :	J. Ikeda.
Civil Engineer :	Y. Asai.

4. Second Section: Outline of the Improvements of Kobe Harbor Under Construction

The completed parts of the new accommodations of Kobe customs, as already mentioned, have been utilized since October 1913. The east breakwater, 1,264 yds. long, and the south breakwater, 1,000 yds. long, were commenced in 1910 and 1917 respectively to protect the new harbor accommodation. Although the accommodations of the harbor have continually been increased, the great European war had the effect of increasing the domestic and foreign trade of the port to such an extent, that further improvements and extensions of the harbor were necessary. The city of Kobe saw the necessity of expediting these additions and volunteered to bear part of the expenditure of the undertaking. The government thereupon transferred the control of the construction of the above-mentioned breakwaters to the home department in April 1919, and decided to commence extending the equipments of the port for handling domestic and foreign trade. The estimated cost of these extensions was Yen 27,100,000 and called for completion of the program by 1929.

The program includes the improvement at Hyogo of facilities for domestic trade, and an extension of facilities on the seafront of Hamabe-dori for foreign trade ; an extension of the facilities at Kaigan-dori, for both foreign and domestic trade ; the reclamation of the seashore of Hyogo and Kobe ; the establishment of more landing and moorings, places for lighters; and an extension of the breakwaters for the purpose of securing a larger protected anchorage.

I

The improvements on the reclaimed ground, for foreign trade, are to be carried out by the finance department, while those for domestic trade, by the city of Kobe. The following is the general plan of the scheme to be carried out by the home department :—

Reclamation

Equipments for	Location.	Area.	Remarks.
Foreign trade		90,747 *tsubo* (about)	Seafront of bund and No. 2 wharf
	Kaigan-Dori	11,147 „ „	
	Hamabe Dori	78,600 „ „	Seafront of Hamabe-dori
Home trade		91,628 „ „	
	Hyogo	81,600 „ „	
	Kaigan-Dori	10,028 „ „	Seafront of Hyogo
Total		182,375 „ „	Seafront of No. 3 wharf

Quays

Equipments for	Location.	Depth below Low water ft.	Length. Ken.	Accommodations.
Foreign trade			1,430.7	15 vessels of large and small size.
	Hamabe-Dori	33	1,430.7	
Home trade			1,670.0	22 vessels of large and small size.
	Hyogo	30	330.0	
	„	28	170.0	
	„	24	600.0	
	„	18	120.0	
	Kaigan-Dori	28	290.0	
	„	18	160.0	
Total			3,100.7	

Landing Places

Equipments for	Location.	Depth below Low water ft.	Length. Ken.
Foreign trade			873.0 (about)
	Kaigan-Dori	12	188.0
	„	9	297.0
	Hamabe-Dori	12	278.0
	„	9	110.0
Home trade			935.0
			935.0 (about)
	Hyogo	12	285.0
	„	9	650.0
Total			1,803.0

Breakwater

Classification.	Location.	Length. Ken.	Remarks.
For morings for foreign trade	Kaigan-Dori	100.0	For mooring of lighters
Total		100.0	
Kobe harbor	East breakwater (the work already commenced)	632.0	Completed except parapet wall
„ „	No. 1 East breakwater	600.0 (about)	Extension of east breakwater already started
„ „	No. 2 East breakwater	950.0	
„ „	South breakwater (the work already commenced)	500.0	Under construction
Total		2,682.0	

II

The following is the general plan of the improvements for foreign trade to be carried out by the Kobe branch of the construction section of the finance department. The work commenced in 1921 to be completed within twelve years.

Sheds.—There will be eight sheds erected on the moles which will be of two classes, i.e., ferro-concrete or steel according to the conditions of the ground upon which they will be built. Two of the sheds will be two storied with accommodations for passengers, while the others will be one storied structures built so that they can easily be increased to two storied if desired. The eight sheds along the lighter wharves to be of wooden.

The particulars of the sheds are as follows :

Sheds No.		Length.	Span.	
1	Ferro-concrete or steel	666 ft.	120 ft.	159,840 sq. ft.
2	,,	594 ,,	120 ,,	71,280 ,, ,,
3	,,	540 ,,	90 ,,	48,600 ,, ,,
4	,,	540 ,,	90 ,,	48,600 ,, ,,
5	,,	486 ,,	90 ,,	43,740 ,, ,,
6	,,	360 ,,	90 ,,	32,400 ,, ,,
7	,,	486 ,,	96 ,,	93,312 ,, ,,
8	,,	360 ,,	96 ,,	34,560 ,, ,,
9	Wooden	288 ,,	96 ,,	27,648 ,, ,,
10	,,	228 ,,	42 ,,	9,576 ,, ,,
11	,,	228 ,,	42 ,,	9,576 ,, ,,
12	,,	234 ,,	84 ,,	19,656 ,, ,,
13	,,	198 ,,	84 ,,	16,632 ,, ,,
14	,,	180 ,,	60 ,,	10,800 ,, ,,
15	,,	600 ,,	60 ,,	36,000 ,, ,,
16	,,	600 ,,	60 ,,	36,000 ,, ,,

Ferro-concrete or steel shed.	8 ft.		532,332 sq. ft.
Wooden sheds.	8 ,,		165,888 ,, ,,
		Total	698,220 ,, ,,

N.B.—The area 159,140 sq. ft. of No. 1 shed includes 79,920 sq. ft. second story.

The area 93,312 sq. ft. of No. 7 shed includes 46,656 sq. ft. second story.

THE MAIN BUILDING OF CUSTOM-HOUSE AND BRANCH OFFICE.—A three-storied building with a ground area of about 21,600 sq. ft. will be erected in the customs compound to be occupied by the Kobe custom-house and a two-storied office with a ground area of about 5,238 sq. ft. at the American hatoba as a customs inspection office. In addition there will be constructed, baggage examination offices, electric substation, passenger gang ways and other essential improvements.

ROAD AND RAILWAY.—There will be constructed three miles of pitch and asphalt roads, 12 to 30 feet wide, having granite pavements. The railway lines on each mole will connect with the trunk line at Onohama station. Many turntables, and scales for wagons will be installed. Wide gauge rails for the electric traveling cranes will be laid along the quays. The total length of rails, both for wagons and cranes, will be about 6.2 miles.

CRANES.—Eight sets of 1½ tons traveling electric cranes and four sets of five tons traveling electric cranes will be erected on the quays.

ELECTRIC LIGHT, WATER SUPPLY, ETC.—Electric lights will be placed along the roads of the new compound and inside the sheds. Water mains will be laid along the quay walls and hydrants will be installed throughout the compound for supplying vessels and for emergencies. Two powerful tug-boats for towing vessels alongside the quays will be provided.

The Expenditure

The expenditure for the works under the jurisdiction of the home department is estimated at Yen 31,770,000 of which Yen 11,000,000 is for foreign trade equipment, Yen 9,300,000 for domestic trade equipment, Yen 6,800,000 for the constructions of the breakwaters and Yen 4,670,000 for the construction of the breakwaters already started.

The total expenditure for the works under the jurisdiction of the finance department is estimated at Yen 9,500,000. Thus the total expenditure is Yen 41,270,000 of which Yen 16,450 will be borne by the city of Kobe.

Cut in Japan's Railway Estimates

THE estimate for the special accounts of the imperial railway department for 1923-4 is now being compiled and it is believed that the department is facing difficulties in the work of compilation, says the *Osaka Mainichi*. It is understood that the department will have to cut the plans of new railway lines by 20 per cent.

The revenues of the department in April, May and June, from the passenger and freight services, showed some increase, but the rate of increase has been decreasing month by month. It is believed that it will be difficult to estimate the total revenues of the department over Yen 400,000,000, which was the estimate for the working budget for the present fiscal year. Even if a cut may be realized in expenditure by administrative readjustment, the net profits for the present fiscal year will not go beyond Yen 103,-000,000. Even should the surplus of this year be carried forward to next year, the amount would be very small.

Moreover, the finance office has requested that the policy of 25 per cent. "*tembiki shugi*" (stoppage at source) be carried out in the bond issue policy of Yen 80,000,000, of the railway department, i.e., to cut it down to Yen 60,000,000. If that cut be realized, the department will find it impossible to carry out even the already decided plans.

Claim of Department

The claim of the department, already approved, for the 1923-4 instalment, amount to Yen 195,950,000, including the estimate of 20 per cent. for the rise of prices. This amount can barely be met even if the bond policy of Yen 80,000,000 were altogether approved of by the finance office.

The department, however, is obliged to claim appropriations for a number of new railway lines, in deference to the railway construction law, passed by the 45th session of the diet. If nothing be done in that direction, the law will become a dead letter, thereby endorsing the views expressed in the house of peers, during the last session of the diet. Count Oki, the minister of railways, however, has declared in favor of carrying out the plans of the railway construction law, whereas Mr. Ishimaru, vice-minister, who has remained in office since the ministry, is responsible for the law.

As for the Seiyukai party, the question is one of the dignity and honor of the party, since that party had supported the construction law in the past.

Question of Electrification

There is further the question of electrification of railways, an appropriation for which needs to be asked for 1923-4. This item will call for Yen 60,000,000 and odd figures of expenditure for construction of railways, cars, generating and transforming stations. The expenditure for electric cars will amount to Yen 35,000,000 out of that total. Of the remaining Yen 30,000,000, there is an amount of about Yen 7,000,000 for the expenditure for electrifying the railway between Tokyo and Numazu, which had already been voted for before, leaving Yen 23,000,000 to be obtained anew.

If the work of electrification is to be completed in five years, the new annual instalment will amount to about Yen 4,000,000 or more.

As to the new railway lines to be laid down, at an average of 40 miles of length per line, Yen 200,000 of expenditure per mile, a total of Yen 8,000,000 will be needed for completing one railway line. If ten lines are to be built, Yen 80,000,000 will be needed.

The Fuji-Minobu Railway Co.

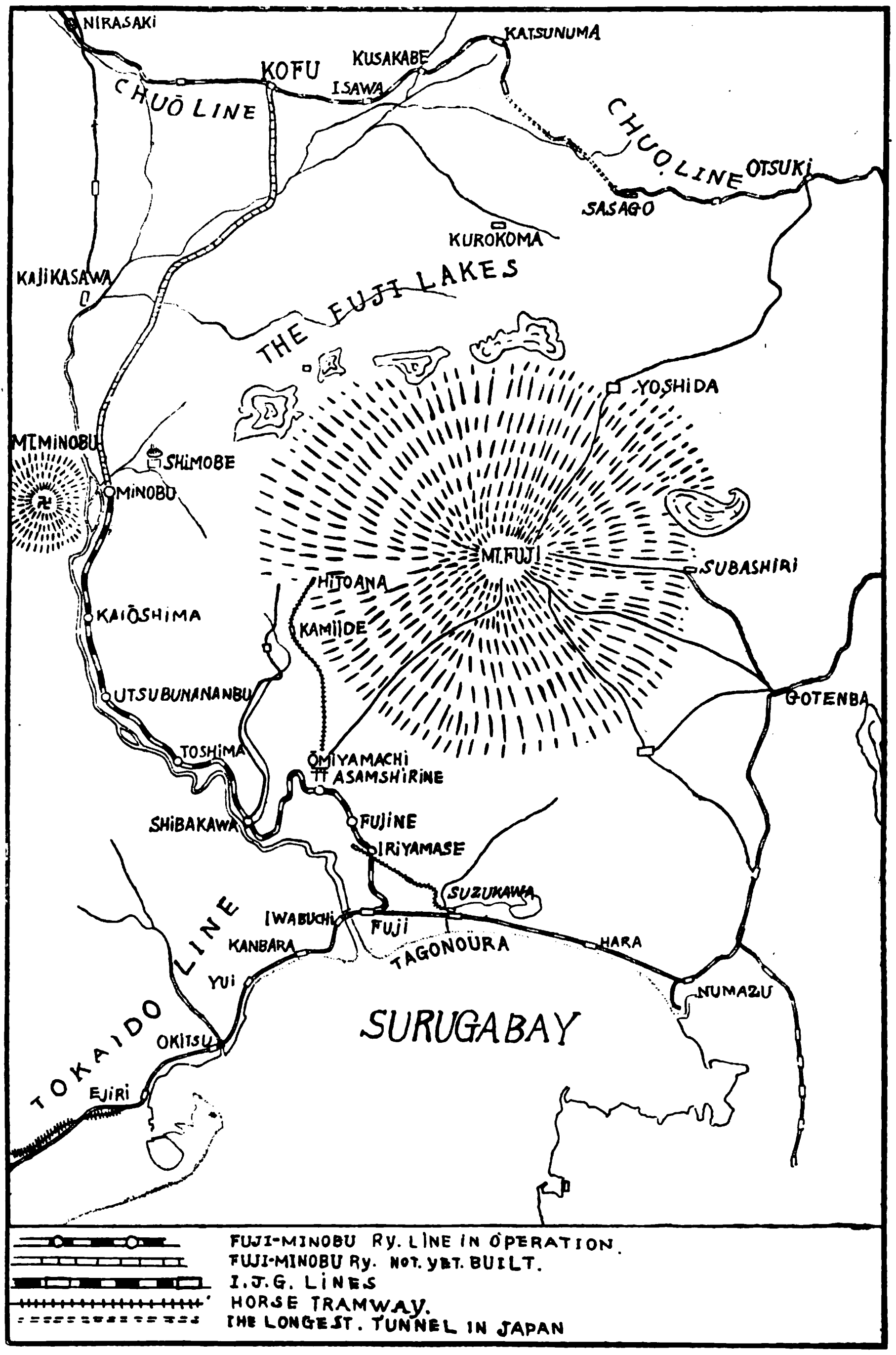
Plans for its Electrification

THE Fuji-Minobu Railway Co., Ltd., was established in 1912, purchasing the line and equipment of the Fuji Tetsudo K. K., for Y.106,400. The new company at once began to improve the line between Fuji station on the Tokaido line of the imperial government railways, and Omita, the town of a distance of 6 miles and 32 chains. The gauge was changed to Japanese standard guage, 3 feet 6 inches, and the line opened to business on July, 20, 1913. At the same time a horse tramway was built between Suzukawa and Iriyamase, 69 chains.

In the first half of 1914, the company began construction of the line between Omiya and Minobu, under a guaranty from the Kounji temple on Minobu mountain, the chief temple of the Nichiren sect of Buddhism of an annual passenger traffic of 150,000 round trips for five years and agreed to pay any deficiencies in income, if the through passenger traffic failed to reach that figure.

The section between Omiya and Shibakawa, 5 miles, 48 chains, was opened March 1, 1915. North of Shibakawa, the country is mountainous and very rocky and it took three years to complete the section between Omiya and Tashima, 4 miles, 32 chains, which was opened to business August 10, 1918. The remaining section between Omiya and Minobu were not completed till 1920, the total mileage being 26 miles, 79 chains.

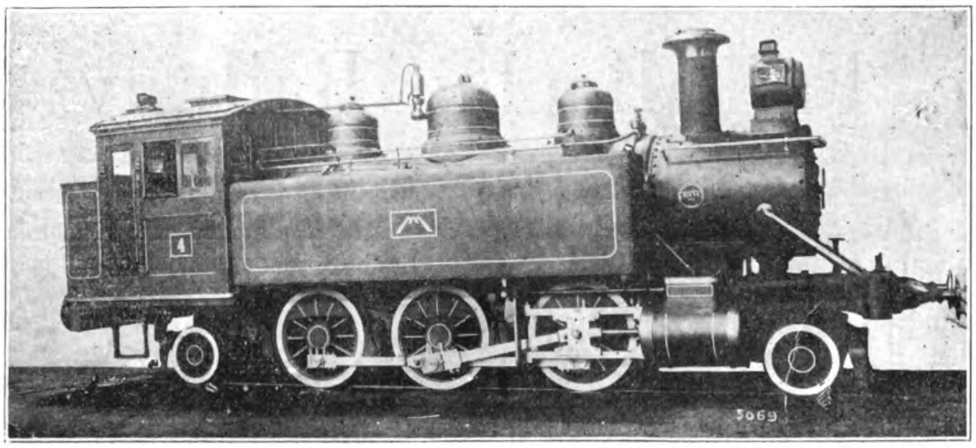
Immediately upon the completion of the line to Minobu there was a rush to visit the Kounji shrine. During the first half of 1920 the number of passengers carried reached the highest figure in the history of the company, but owing to the financial depression there has since been a falling off in traffic. In 1921, the seven hundredth anniversary of the birth of Nichiren was celebrated at Minobu, but the occasion failed to attract a larger number of passengers than at the opening of the line. The number of through passengers increased and revenues were augmented by raising the passenger fares in April, 1920. The number of holiday-makers, however, is increasing especially climbers of Mt. Fuji. The younger generation is also studying the Nichiren doctrines, now popular because of the intensity of the nationalism preached by that sage.



The scenic beauty of the line attracts many passengers and a through traffic arrangement with the government's line at Fuji station, has materially augmented the number of passengers carried. Increase of business from year to year was largely the result of lengthening the line, but some of the company's prosperity was due to the general prosperity of the country. Consequently when the panic of 1920 wrought havoc in all classes of industry, the Fuji-Minobu Railway, also felt its effects in a decreased passenger and freight traffic.

As a general rule construction costs of mountain railways are extremely high and the Fuji-Minobu line is no exception to this rule. Furthermore, excursion lines have little, if any, freight traffic to decrease costs of operation per mile. The Fuji-Minobu line is primarily an excursion line, although it is doing a fine bit of pioneer work in opening up a new district for settlement and agricultural development through easy means of transportation. Between Fuji and Shibakawa costs of construction were quite normal, but between Shibakawa and Minobu, north of Shibakawa, the line runs through the mountains and costs of construction were extremely high. The company, therefore, charges a very high passenger fare.

Just before the line north of Shibakawa was opened to business, the imperial government railways raised all passenger fares on the plea that the cost of commodities had risen to such an extent that an increase in passenger fares was quite in order. Permission to raise rates was also extended to private railways, and the Fuji-Minobu line took advantage of this privilege, and raised the fare per mile to 5.5 sen, third class, for the Fuji Omiya section, while from Omiya to Minobu it is 1 sen higher per mile. Second class is twice the third class fare. In figuring freight rates the company was permitted on April 18, 1921, to estimate mileage at six times the actual distances. Consequently, freight rates are high.



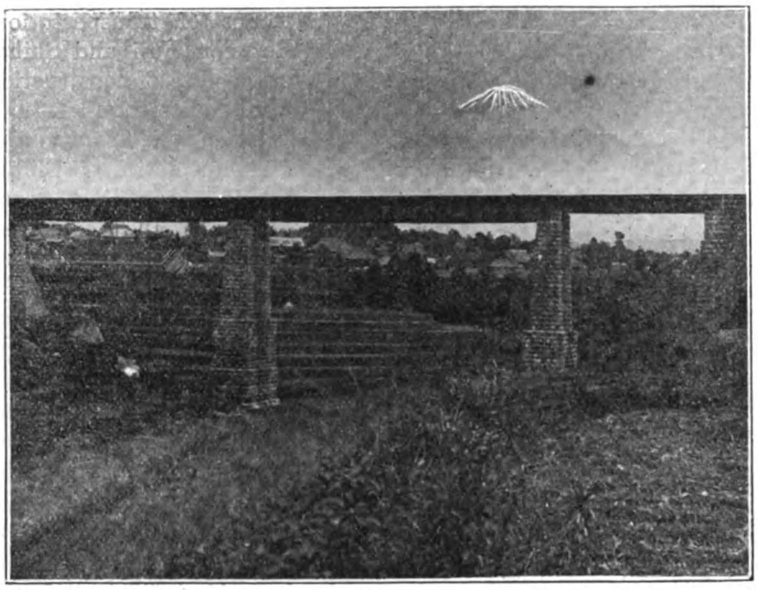
Baldwin Locomotive for the Fuji-Minobu Railway, Class 10-24-¼-D, 103 : Gauge 3-ft. 6-in. : Cylinders 15-in. by 20-in. : Total weight, 84,950-lbs.

Despite the advantages enjoyed by the company it has encountered many difficulties. Most of the construction was carried out at a time when prices were at their highest. Consequently the cost of construction per mile mounted higher and higher every year. The estimated cost of the 26 miles, 79 chains, between Fuji and Minobu, including stations, office buildings, etc., was Y.3,750,000, but by the end of 1920 they had reached Y.4,130,000 and at the end of 1921, Y.4,270,000.

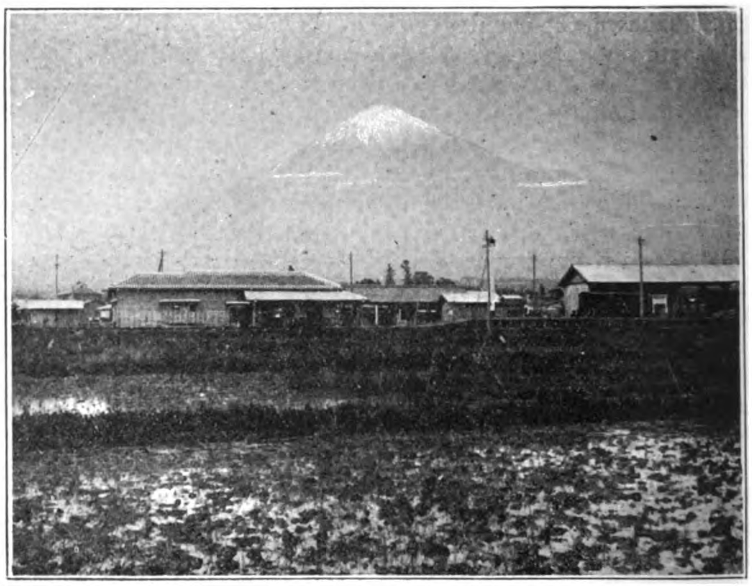
Owing to the rising costs of materials and the consequent expense of laying the line between Omiya and Minobu, a great part of the work was imperfectly done. Shortly after the line was opened to business in 1920, a severe typhoon did much damage to the line, necessitating a further outlay of Y.600,000. for reconstruction.

At such a cost it seems unprofitable to extend the line, but if the entire cost of construction to date is divided by the entire length of the line, it brings the cost per mile down to Y.154,-500. This is a little more than twice the cost of the line between Fuji and Shibakawa and, considering the nature of the country, is not exorbitant.

When this railway was first opened to business the greater part ran through rice fields and freight was then the principal source of revenue, the Fuji Paper Mill Co., Ltd., being the principal shippers. This company now pay Y.20,000 a month in freights. Next comes the transport of logs and lumber. In order to increase the freight revenues, an extraordinary meeting of the shareholders was held in May, 1918, to approve the organization of a subsidiary company to engage in timbering, charcoal and acetic acid manufacture, together with afforestation along the line of the railway. Official permission was given for this enterprise and since 1920 the company has been actively engaged in cutting timber and preparing to manufacture charcoal. For this business during the second half of 1919, an expenditure of Y.34,304 was provided for, increased to Y.88,892 in the second half of 1921. The loans raised have been utilized for this enterprise.



Toyotsu River Bridge, Fuji-Minobu Railway



Omiya-Machi Station, Fuji-Minobu Railway

The cost of construction has gradually exceeded the paid-up capital and to meet its obligations the company issued long-term bonds for Y.2,000,000. The authorized capital is Y.4,000,000, of which only Y.3,200,000 is paid up. At the end of 1921 the legal reserve of the company amounted to Y.40,308.

If the cost of the line between Fuji and Shibakawa is deducted from the Y.4,270,000, it at once shows that the cost of the line between Shibakawa and Minobu is three tines more than that section. According to the company's business reports the value of the line and buildings, between Fuji and Shibakawa, was estimated as follows :

1916, December 31, at	Y.848,000
1917, June 30	851,000
1918, December 31	855,000
1918, December 31	857,000

The length of that section is 11 miles, 64 chains, so that the average construction cost per mile was between Y.72,500 and Y.72,600. But the cost of construction between Shibakawa and Minobu, including stations and office buildings, amounts to Y.3,-500,000 in all, and as the line is 15 miles, 15 chains long, its construction costs per mile were more than Y.235,000.

Experience in Japan has shown that railway companies (such as the Fuji-Minobu), whose income depends more upon passenger traffic than on freight, make greater profits when electrified. During the war and in 1920, the price of coal was almost prohibitively high and has not yet come down to an economical level. With the idea, therefore, of electrification the company instituted an investigation into the cost and feasibility of the change. A report was made in 1921, which showed that great savings could be made by such a step, and in November 25, 1921, the railway department granted the license to make the change.

One of the great advantages of the Fuji-Minobu Railway is its close connection with the Fuji Hydro-Electric Co., Ltd., whose president is also head of the railway company. Power for operating the electric line can be obtained at very low rates from the

Fuji-Suiden, thus obviating the necessity of building expensive power plants.

After electrification, the number of stations along the line will be increased, in accordance with the plans to do everything possible to develop the district. With the increase of population along the line, the Fuji-Suiden will obtain new customers for light and power. So the future development of the Mt. Fuji districts depends in great measure on the co-operation of these two concerns.

The railway company holds a license to build a line between Minobu and Kofu, on the Chou line of the imperial government railways, a distance of 28 miles, 57 chains. When this extension is made the Fuji-Minobu railway will become an important connecting link between central Japan and the sea coast.

Unfortunately the company's application for permission to commence construction seems to be held up in the railway department, and construction is accordingly postponed. It is said that the railway department plans a line between the central line at Kofu and the Tokaido line at Iwabuchi, at the mouth of the Fuji River, to be commenced in 1923 and completed by 1928. The Fuji-Minobu license to build expires in 1926 and it is urged that the railway department sanction the immediate construction, of the Minobu-Kofu link, even though in the near future the line should become nationalized.

PRIVATE RAILWAYS IN JAPAN

A GOVERNMENT report just published shows 253 (private-owned railways in Japan, including 153 open lines on May 1, 1922, 109 with permission to survey, and 92 under construction or about to begin work. The total length of these railways was 4,771 miles and 57 chains ; in operation, 2,165 miles and 7 chains ; under construction, 1,066 miles and 50 chains, and licensed to survey, 1,549 miles.

The most noticeable tendency in railway construction is the growth of electric lines. Of the lines now in operation, 21 are electric, and 129 steam railways. The lines under construction include 23 electric and 68 steam, while those holding permission to survey include 37 electric and 64 steam railways.

Steam trains were exclusively operated over 1,822.5 miles of the lines now in operation. About 194.4 miles were electric, and 143.4 miles were used by both steam and electric cars. Considering that the number of such mixed power lines is only 7, this mileage is rather high.

The total capitalization of the 253 companies on May 1, 1922, was Y.678,082,427. Estimated costs of construction were Y.691,873,283. Companies in operation were capitalized at Y.328,425,451, and their costs of construction had amounted to Y.196,227,721, on the date of the report. Lines under construction were capitalized at Y.79,726,976, and their estimated costs of construction until the completion of work were Y.112,082,143.

The estimated costs of construction of the lines licensed to survey are greater than the total costs of all lines now in operation and under construction. These lines include the ambitious underground railways for Tokyo. But their actual construction is extremely problematic, it having been found difficult to interest capital, either domestic or foreign, in these plans. Of the total estimated costs of Y.383,563,419, for all these lines, Y.159,000,000 is estimated for the four projected underground railways.

The following table gives details of all the lines now in operation, under construction, or licensed to survey :—

JAPAN'S PRIVATE RAILWAYS, MAY 1, 1922

Power	Number	Mileage	Capital	Costs of Construction, actual and estimated
Steam	191	3,637.06	Y.338,282,427	Y.318,788,131
Electric	62	895.56	197,240,000	181,858,690
Electric cable	9	7.32	5,400,000	2,353,337
Electric underground	4	44.75	97,000,000	159,000,000
Electric and steam	9	175.37	35,590,000	29,248.125
Gasoline	2	8.27	570,000	570,000
Human power	1	2.64	—	55,000
Total	253	4,771.57	Y678,082,427	Y691,873,283

Licensed Railway Construction

The Yamato Tetsudo K.K. (Yamato Railway Co., Ltd.) in Nara prefecture, obtained on June 7, 1922, official permission to extend its line from Sakurai-machi, Isoki-gun, Nara prefecture, to Nahari-machi, Naka-gun, Mie prefecture, 17 miles, 40 chains ; gauge, 3 feet 6 inches ; electric power. The cost of construction is estimated at Y.3,000,000. The present line in operation is from Tawara Moto, to Shinnoji, in Nara prefecture, 6.3 miles, steam cars. The weight of rails used is 45 pounds.

Government Railways to Complete Double Tracking

During the fiscal year 1922-1923, the Imperial Government Railways will double 100 miles of track. Next to the main line, between Tokyo and Kobe, the busiest section, is the Sanyo line, between Kobe and Shimonoseki. This line, between Kobe and Waki, 71.4 miles, is now double tracked. At a cost of Y.5,000,000 this line is now being doubled in the neighborhood of Wakayama, so that between Kobe and Wakayama all will be double tracked before the end of 1922. The whole line between Kobe and Shimonoseki is to be doubled by the end of 1928, but using certain other appropriations it will be completed by the beginning of 1927.

Electric Machinery Makers Combine

UNDER the mediation of Mr. M. Ota, the managing director of the Keihan Electric Tramway Company, the amalgamation of the Kawakita and Toyo Electric Machinery Companies is reported to be steadily progressing. The amalgamation of electric machinery companies has been planned several times, but in vain. Just after the commercial depression set in, Mr. M. Fukuzawa, then, the president of the Nagoya Electric Lighting Company, induced the Kawakita and the Osaka Electric Machinery companies and the machine manufacturing department of the Osaka Electric Lighting Company of that city together with the Okumura Company of Kyoto to consolidate and the plan progressed as to investigating the assets and liabilities of each company, but failed because the Kawakita asserted a desire to secure the sole selling right of the new consolidated Company's products.

Immediately after that, the three Companies excluding the Kawakita, induced the Hitachi Electric Machine Manufacturing Works and tried to form a consolidated company great enough to compete with the Shibaura Works of Tokyo, but the plan failed also owing to the opposition of the creditors of the Okumura Electric Machine Company.

After that no serious attempt at amalgamation has been made, the market being left open for competition among the companies. The Toyo Electric Machinery Works, which is to amalgamate now with the Kawakita, has its head office in Tokyo and is manufacturing motors and other electric tram and steam locomotive machinery.

No. 3 Mill of the Fuji Paper Mill Co., Ltd. in Shidzuoka Prefecture

Paper Making in Japan

The first part of this article is from the Annual Number of the "Paper Trade Journal"; the rest compiled from official sources

THE manufacture of paper in Japan was started in the year of 1873 and since then its progress has been very slow, being influenced by the undeveloped state of Japanese finance and culture in general, which naturally required a limited amount of paper. However, in the year of 1890, one of the promoters of the Fuji Paper Manufacturing Company which is now regarded one of the largest of its kind in the east, was despatched to Europe to study the process of manufacturing paper from woods and on his return a factory was established at the foot of Mt. Fuji. At the time, only one machine was run in making paper, the output of which was sufficient to cover the entire demand of all the news publishers in Japan, and leave a surplus of 30 to 40 per cent. According to what the records tell us, that surplus was a hard knot to dispose of. Since then, the industry has made a rapid progress. But at the time of the Russo-Japanese war, the expense of producing paper in Japan was so great as compared with that in America, Sweden and Norway, that paper manufactured in those countries was cheaper, even with freight and duty added.

In the year 1906 just after the Russo-Japanese war, Japan began utilizing woods produced in Hokkaido, north extremity of Japan, in making paper. Woods in Japan proper are generally regarded unsuitable for the purpose because of poor quality and comparatively high price. "Ezo Pine," or Abies Sachlinensis, coniferous class of woods, or those produced in the north of the 47th degree of latitude are considered the best for paper making. Woods produced in Karafuto—formerly called "Sakhalin"—a small isle lying north of the Hokkaido and those on the "Coast Province" of Eastern Siberia are also considered adaptable.

At that time even the most skilled workman was able to produce only 200-ft- a minute with a machine 75.6-in. wide which was the largest in Japan then.

Beginning of a New Era

In August, 1921, however, the Fuji Paper Mills installed in their Hokkaido plant a machine 186-in., wide. This machine was started in November, producing at the rate of 800-ft. a minute a speed four times as great as the first machine mentioned. This clearly indicates the rapid progress Japan has made in recent years. At present, Norway and Sweden are very skilful in making the thinnest paper, while America makes it a distinctive feature to produce the thick paper most quickly, therefore Japan, after making elaborate efforts and taking into consideration the strong points of those countries, is now making news print of substance between America and Sweden. Further she is doing her best to make paper at as cheap a rate of production as possible, by producing a large amount of paper with as little material as possible. Formerly, materials were brought to the paper factories on workmen's shoulders or on carts and when paper was required to be reeled on roll, such paper had to be sent on to another factory for the purpose, but the present arrangement, requiring no workmen's hands and depending upon the action of machineries exclusively, it is no exaggeration to say that Japan is in no wise inferior to those countries in process of manufacture as in cost of production. While paper manufacturers in general are paying much attention to producing paper at the lowest rate of expense, they are endeavoring not to give the slightest uneasiness to employees. Therefore, even in time of depression in the year of 1920 they never cut down wages, but instead raised them twice, in February and August 1921. In other words, they make it a point to give better wages but not to employ so many workmen.

Making New Varieties of Paper

Prior to the European war, Japan preferred to make paper that required little trouble or the so-called "cheap class of paper." This was owing to the inferiority of technique when they manufacture any different kinds of paper or thinner ones, inferior qualities were turned out at a high cost of expense. As a result, paper thus produced was sold at less price than it cost. While other countries were making different weights of paper at comparatively cheap cost during the war-time such paper was not imported to Japan in large quantity, therefore being pressed by the keen demands in the

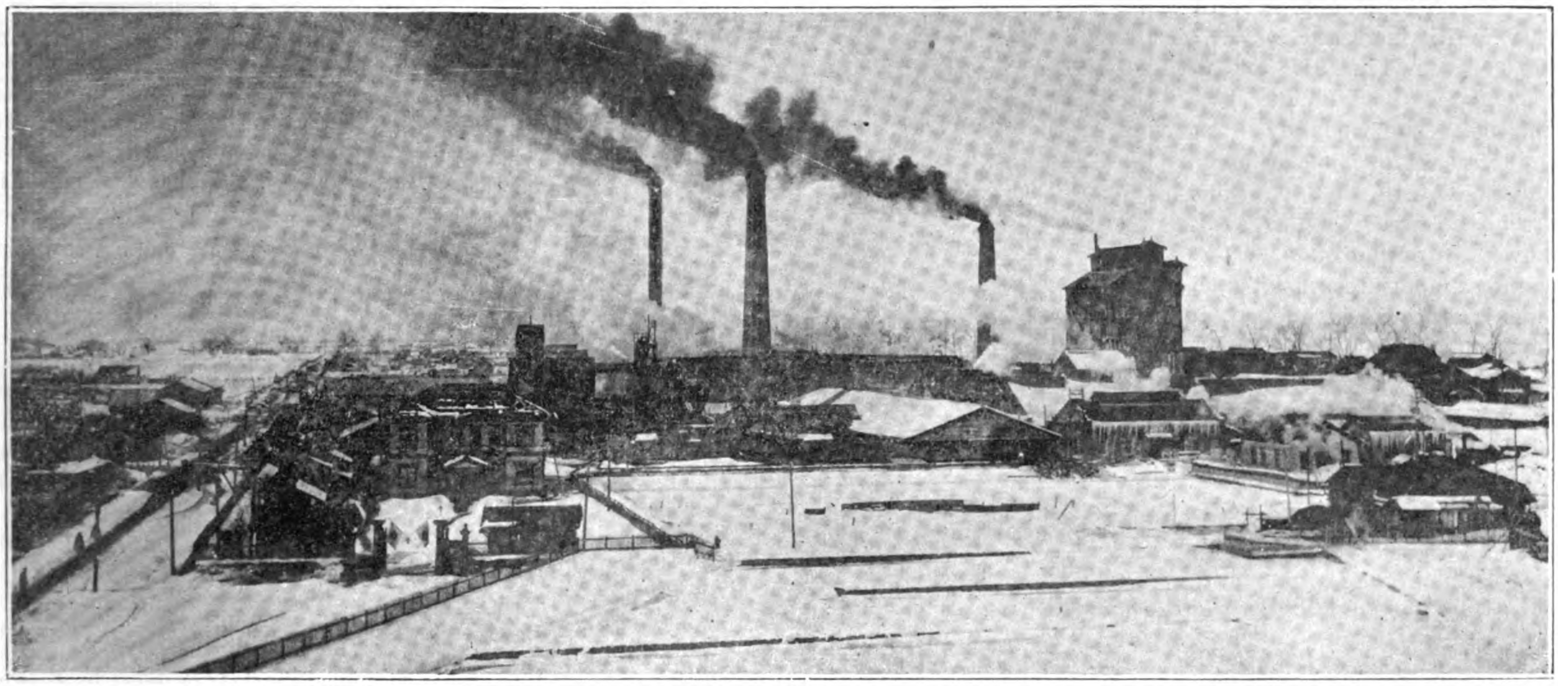
home market, various weights of paper had to be manufactured, which was sold at high prices. This was a unique experience for paper manufacturers in Japan. They did not lose money, but rather profited and now Japan can make any grade of paper from woods, straw, rags of qualities not at all inferior to those manufactured in other countries. However, there is one variety in which she is behind America and Europe viz., packing (wrapping) paper. This is because Japan is now using common sulphite-pulp and not using kraft-pulp, which would cause high cost of production. This leads her to hesitate about packing paper at present. In Sweden and Norway, the process of making this grade of paper, has been greatly improved. With a view to following this process, Japan sent a few people to these countries to study it a year ago and expects their return very soon. When this process is mastered Japan may be said not to be behind any paper making country in the world.

Paper Manufacturers' Association Formed

In Japan, leading paper manufacturers organized the Paper Manufacturers' Association some time ago with the idea of improving the art, fixing selling prices, etc. Prices of paper were at high level up until the middle of April, 1920, when the paper market in the city became demoralized. Generally speaking, in the months of June, July, August, demands for paper are always less simply because of the short-nights which naturally afford not much time for reading papers, magazines, etc. The months of September to November are called the reading season, when demands are largest of the year. Therefore all manufacturers expect an unusually big demand in the month of September. But anticipated sales did not materialize and therefore the Paper Manufacturing Association decided to limit output by 20 per cent. in the latter part of December, 1920. Why had they taken such a step ? Prices of commodities were declining all over the world and if the matter were left alone, the paper market in Japan would be thrown into a chaotic condition rapidly, therefore the limitation system was taken up in order to lower the prices of paper gradually. If prices of paper were forced down at a bound, paper dealers as well as manufacturers themselves would naturally suffer from the financial operation, in view of which manufacturers gave as much accommodation as possible in every respect to leading paper dealers, lowering prices very gradually. As a consequence, at the end of October, 1921, stock of paper decreased as greatly as 40 per cent. when there arose a question about withdrawing the limitation of output, and it is possible that this may be done soon. Be that as it may, the Paper Manufacturers' Association is indispensable for the promotion of the paper business in Japan, in view of the fact that through the association the paper market in Japan had not been thrown into confused state by the worldly depression.

Amount of Paper Manufactured

As regards the amount of paper manufactured in Japan—that is paper manufactured by members of Paper Manufacturers' Association—the appended list will explain all details. Needless to say that list does not include the manufacture of so called Japanese paper, such as tissue, Torinoko, and strawboard paper. According to the investigation made public recently, the total of paper Japan consumes in one year would amount to 700,000,000 pounds. If this figure be apportioned to Japan's population, it amounts to 12 pounds per head per year and according to what we learn about foreign countries, in the year 1918, France is said to have consumed 48 pounds, British Empire 50 to 55 pounds, the United States of America 58 pounds, while China consumed only 2 pounds. Speaking about prior to the European war, European Russia consumed 22 pounds per head, Asia-Russia 7 pounds, while Japan consumed about 10 pounds. What surprises us most is that the consumption of the United States of America in the year 1920 was figured at 112 pounds per head. From the above, Japan seems far behind the advanced countries, while it is specially amazing to note the rapid progress the United States of America has made in recent years.



The Ebetso Mill of the Fuji Paper Mill Co., Ltd., in the Hokkaido

Demand for Paper Increasing

Demand for paper in Japan is increasing at the rate of over 10 per cent. per year. While at present, the supply of paper seems not to equal the demand after two years it is obvious that demand will make such increase that supply will become short. Notwithstanding this, Japan proper or even Hokkaido are no longer in a position to meet such increasing demands, but they may be met by Karafuto. Fortunately, during the European war, three pulp-factories were established in Karafuto the output of which will amount to about 80,000 tons per year. This 80,000 tons not being sufficient to meet the home demand, Japan is now importing about 50,000 tons of pulp from overseas countries. Therefore every endeavor is being made for additional pulp-factories in Karafuto. The factories at present are established near the seashore for shipping facilities, but in the inner part of the island, there are many

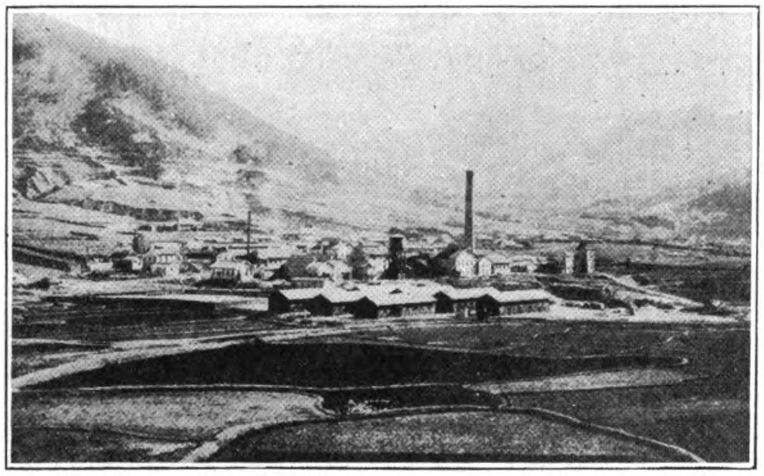
good forests untouched and before long the forest-railways are to be built to reach there. Also there are many good forests on the cost province of eastern Russia with abundant coniferous woods, in which some members of the Paper Manufacturers' Association have already invested capital as the reports put it.

News Print First in Demand

Among papers of various kinds, news print stands first in demand and improvement. In the year 1916, the largest publishers in Japan could only issue 200,000 per day, while to-day some news publishers issue something above 600,000 per day. If, therefore, the improvement continues to such a degree, the news publishers will naturally get their supplies from overseas if the expectation of manufacturing enlargements in Japan are not realized within a few years.

During the war time, Japan had 29 strawboard factories all of which possessed the up-to-date machinery, but at present only 8 factories are run. This, needless to say, is caused by the world-wide depression.

As is shown on the attached list, total amount of paper manufactured declared by the Paper Manufacturers' Association was put at 129,000,000 pounds in 1904, and it increased to 230,000,000 pounds in 1911, and to 559,000,000 pounds in 1920. This 559,000,000 pounds shows an increase of four times as much compared with that of 1904, within 16 years. October, 1921, showed an output of 45,000,000 pounds a month to which 20 per cent. limitation being added, it represents 54,000,000 pounds monthly or 600,000,000 pounds per year. That is to say, the last figure will indicate an increase of 13.3 per cent. per year since 1904.



Plant of Chosen Pulp Manufacturing Company, Kiho, South Keisho Province

PAPER MANUFACTURED, EXPORTED AND IMPORTED

Years	Amount Manufactured, lbs.	Amount Imported, lbs.	Amount Exported, lbs.
1904.. ..	129,215,000	34,046,000	11,014,000
1905.. ..	134,441,000	76,336,000	11,042,000
1906.. ..	132,432,000	79,257,000	19,396,000
1907.. ..	147,296,000	89,890,000	14,044,000
1908.. ..	148,647,000	65,052,000	9,788,000
1909.. ..	162,104,600	90,925,000	7,073,000
1910.. ..	191,591,000	92,823,000	14,247,000
1911.. ..	228,163,000	74,002,000	9,566,000
1912.. ..	251,337,000	77,214,000	13,462,000
1913.. ..	295,893,000	80,038,000	794,000
1914.. ..	327,614,000	54,190,000	14,406,000
1915.. ..	367,579,000	27,068,000	26,937,000
1916.. ..	405,468,000	35,694,000	55,427,000
1917.. ..	455,000,000	16,637,000	69,485,000
1918.. ..	498,965,000	34,277,000	72,815,000
1919.. ..	519,142,000	56,303,000	66,352,000
1920.. ..	559,835,000	56,879,000	51,049,000

Not including straw board.

There are many paper manufacturing companies in Japan, the greater number of whom belong to the Paper Manufacturers' Union. These companies consume on an average some 150,000 tons of pulp in a year, of which mechanical pulp amounts to about 70,000 tons, and is supplied from home sources, while chemical pulp—80,000 tons—comes as to half from abroad, 30,000 tons from Hokkaido, and 10,000 from Karafuto.

The following table gives the production of foreign paper by the members of the Paper Manufacturers' Union in 1919 :—

Manufacturer.	Output for 1919. lbs.
Oji Paper Mill	192,222,621
Fuji Paper Mill	144,208,932
Mitsui Bishi Paper Mill	51,076,880
Kyushu Paper Mill	28,513,622
Kokura Paper Mill	20,446,684
Yokkaichi Paper Mill	17,927,951
Kiso Industrial Co.	15,843,796
Central Paper Mill	14,365,566
Tokyo Pasteboard Mill (excluding pasteboard)	12,979,192
Hokuyetsu Paper Mill (excluding pasteboard)	6,265,745
Kumano Paper Mill	4,004,649
Umedzu Paper Mill	3,904,710
Naknoshima Paper Mill	3,649,736
Yukosha Paper Mill	2,378,859
Total	517,788,943

Of this total, newsprint accounted for 229,761,192-lbs.; common printing paper for 81,985,399-lbs; fine printing paper for 72,736,622-lbs.; and packing paper for 23,560,728-lbs. The total manufacture of 519 million pounds odd compares with 499 millions in 1918 and is no less than 192 millions greater than the Union's production in 1914.

As regards exports in 1919, printing paper totaled 29,082,000-lbs., valued at Y.6,461,332; and pasteboard 29,526,000-lbs., valued at Y.2,900,803. The total exports were valued at Y.33,340,277. The principal customers were China, Y.10,273,758; Kwangtung Province, Y.4,744,544; Asiatic Russia, Y.3,304,617; Hongkong, Y.1,970,845; and India, Y.1,390,970.

The Japanese Paper Market

Since the war the United States, in marketing paper in Japan, has met with exceedingly keen competition. As a result the American position in the Japanese paper import trade has suffered conspicuously during the last two years. In the following table is shown the recent decline in importance of the United States as a source of paper for Japan compared with Great Britain and other countries :

Country.	1919 *Yen.*	1920 *Yen.*	1921 *Yen.*
Great Britain	1,690,948	3,614,170	2,125,073
United States	15,678,018	8,770,118	4,196,360
Other countries ..	1,017,926	5,023,982	6,053,298

Note.—One yen equals about 50 cents.

Competition Affecting American Paper Exports

This remarkable decrease in the proportion of the trade held by the United States is due to the return of Scandinavian and German competition. At the present time Americans generally are out of the market, except in certain lines, such as bond and ledger paper. European competiton is extremely keen, and European manufacturers are now able to offer goods at lower prices than can American manufacturers.

The figures below show the imports of various kinds of paper into Japan in the year 1921 :

Paper imports into Japan, 1921.

Kinds of paper.	1921 Pounds.	Value.
Printing paper :		
Weighing not more than 58 grams per square meter	6,346,266	$444,808
Other	14,588,933	1,764,213
Writing paper	1,700,000	329,709
Packing paper and match paper	18,995,733	1,932,018
Pasteboard and cardboard	2,464,133	363,162
Tissue paper	1,813,733	264,404
Imitation parchment, paraffin paper and waxed paper	2,238,933	470,772
Other papers :		
Fancy paper	1,270,400	228,675
Other	..	389,620

The imports in the year 1921 were approximately the same in volume as in other years since the war, but are nearly double those of pre-war years. The principal market for printing paper is Tokyo, the center of the printing industry of Japan, while the principal market for packing paper, cardboard and other industrial papers is Osaka, the industrial center of the country.

Newsprint and Other Papers

Japan is now able to supply almost the entire domestic demand for newsprint, using pulp, a part of which is made in the Hokkaido and a part of which is imported from Canada and Sweden. However, the cost of production in Japan is so high that European (especially German) paper mills can compete. The Japanese mills have been restricting production, with the hope of artificially holding up prices, but this has not succeeded owing to the arrival of newsprint from abroad. American newsprint is practically out of the market, owing to the high prices asked.

Kraft paper, formerly imported from the United States in large quantities, is now coming from Europe and Canada. Waxed paper, glassine, and similar papers, which are used in considerable quantities in the local confectionery and other trades and which were formerly imported from the United States, are now being sold here by German mills at prices at which American mills can not compete. Large quantities of cardboard are being supplied by Canadian mills, whose prices are lower than those of American mills. High-grade glazed paper and cardboard for lithography and color printing are now coming from Germany and Sweden.

The American mills still appear to be able to compete in bond, ledger, writing and other high-grade papers, but European competition makes itself felt.

Pulp Industry of Chosen

The preparation of pulp and pulp wood, like most other mechanical industries in Chosen (Korea), is still in its infancy. The supply of pulp wood is considerable. According to official estimates, there are 13,290,000 acres of forests with trees suitable for pulp wood, mostly along the Yalu and the Tumen Rivers, with an average yield of 8.1 cords per acre. The quantity of spruce and fir available is estimated at 34,751,343 cords. Pulp is also made of a certain variety of reed growing in the marshy river bottoms. All but one of the 23 firms engaged in the preparation of pulp wood are Japanese, employing altogether 940 hands (Chinese and Korean). Their total annual output of pulp wood is 39,000 cords.

There is but one modern pulp mill, with a capacity of 15,000 tons per annum. This mill is situated on the Yalu River and is controlled by the Oji Paper Mills, of Tokyo. The quantity exported in 1920 was 9,208tons, most of which was shipped to Japan.

(Ta be concluded in next issue)

Osaka Public Works for 1923

Waterworks

ONE of the urgent matters before the Osaka municipality is the extension of the water mains. During 1922, 168,990 feet of new mains will be laid and 62,970 feet renewed. During 1923, a new water main to a new district recently opened in the western part of Osaka will be laid. Also, a great deal of pipe will be taken up and relaid as part of the necessary work accompanying the widening of the city's streets. Several other plans which affect the water bureau involve a much larger expenditure during 1923 than in 1922, for which Y.523,000 has been provided. Income from water supplied in 1922 is estimated at Y4,326,000, with an increase of 5 per cent. for 1923.

Drain Improvement

Work is now being carried on for the extension of gutters. This program will take three years to complete and the expense will be met by a loan for Y.4,600,000, recently approved by the municipality, of this, Y.1,850,000 will be expended in 1922 and 1923, and Y. 900,000 in 1924. During the present year the Ichioka Izuo and Sangenya districts will be completed, and in 1923 work will be started upon the streets in the newly opened districts of the city.

Electric Railways

The municipal railways are planning many extensions. A new workshop, No. 2 Kujo power plant, a hospital for railway employees, and reconstruction of the transformer station are the most important projects which the electric railway bureau now have in hand. All this work will be completed in 1922, with the exception of the reconstruction of the transformer station, which will be continued into 1923.

The principal equipment additions for 1923 will be the construction of 66 new tram cars and certain extensions of the line which must be carried out as a result of the widening of city roads. The lines in operation will be extended thirteen miles and part of this mileage will be completed in 1923. To meet the expenses, it is expected that a considerable increase in next year's budget will be made.

Road Construction

A sum of Y.8,000,000 to be used for road construction was carried forward from 1921 to 1922, and it is reported that this amount will be spent in purchasing land necessary to improve the following important roads :—

Kami Honcho, 6 chome, to Tamatsukuri, passing through Kasumicho : Nihonbashi, 3 chome, to Ebisu-machi :

A Road between the main road to Nara and Tamatsukuri Kasumicho. Sotoya-cho, 3 chome, to Ote Dori, Kyobashi.

The purchase of land has been going on for some time and the work of construction between Tami-machi and Kyobashi is to commence soon.

Road construction for 1922 will be carried out with funds from the special city tax which will amount to Y.4,000,000. The imperial sanction for floating city loans to meet road construction expenses not having been obtained. Projected work for 1923 includes widening a number of old roads and the construction of several warehouses for the storing of machines and tools.

Electric Tramway for Pyongyang

A despatch from Pyongyang, Korea, reports that the construction of an electric tramway there was sanctioned on July 3. The work will be started as soon as possible and is expected to be completed in the course of March next year. A double line will be laid on the streets between the railway station and Shinson (Sinchangli), two miles in length. There will be twelve stops and the line be divided into two sections, the fare for one section being 5 *sen.* Ten cars will be used.

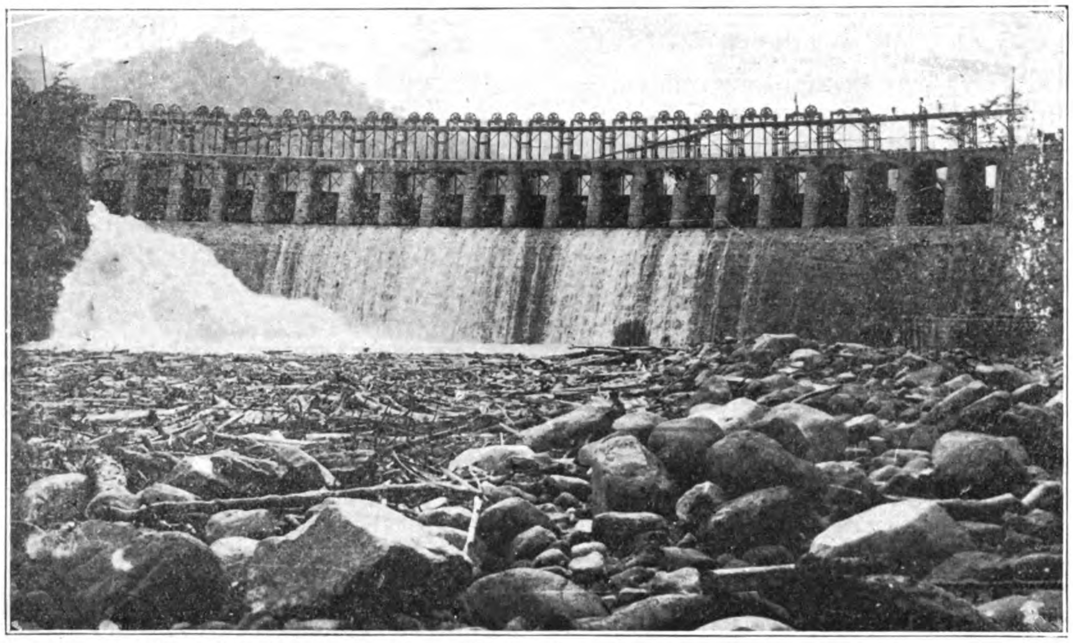
Electrical Developments in Japan

The Kansai Denki Kabushiki Kaisha

SINCE Japan entered a period of industrial re-organization, there have been many electric companies which have amalgamated their interests. The Kansai Denki K.K. was the first company to effect these amalgamations, and it has now the greatest number of other companies absorbed in its organization.

The Kansai Denki Kabushiki Ksiaha is the name of the amalgamated interests of the Kansai Suiryoku Denki K.K. and the Nagoya Dento K.K. Contrary to the usual methods of such amalgamations the Kansai Suiryoku Denki K.K., capitalized at only Y. 4,500,000, absorbed the Nagoya Dento K.K., capitalized at Y.48,487,000.

Between the Kansai Suiryoku and the Nagoya Dento there was a great difference in the value of their properties and also in the market value of their shares. On amalgamating, therefore, the value of the Nagoya Dento was estimated at Y.16,160,000 more than the value of its outstanding share issues and the amalgamated capital of the two companies was fixed at Y.69,149,000. The shareholders of the old Nagoya Dento received four shares of the Kansai Denki K.K. stock for every three of their own shares held at the time of amalgamation.



Dam of the Kinugawa Hydro-Electric Co., at Kurobe, Tochigi Prefecture

Of the combined capital (Y.69,149,000) that of the Kansai Suiryoku Denki K.K. was only Y.4,500,000, the rest represent the value of the properties of the Nagoya Dento K.K. The activities of the new company is centered around the operations of the old Nagoya Dento.

Prior to the amalgamation effected on October 18, 1921, the Nagoya Dento had absorbed the Gifu Denki K.K., the Toyohashi Denki K.K., the Itatorigawa Denki K.K., the Okita Denki K.K., and the Mino Denka K.K. (Mino Electro-Chemical Co., Ltd.). In effecting these combinations with its own interests the Nagoya Dento allowed increased estimates of value to the Toyohashi Denki K.K., the Gifu Denki K.K. and the Okita Denki K.K., while it accepted at slight under-valuations the property of the Itatorigawa Denki K.K. and the Mino Denka K.K.

In effecting these amalgamations the Nagoya Dento increased its capital by Y.14,737,000, of which Y.9,180,000 was paid up. Of this increased amount, something like Y.2,700,000 was based on the increased valuations allowed for the properties of the three companies. This increase, however, had no ill-effects on the Nagoya Dento whose operations thereafter proved the value of its procedure.

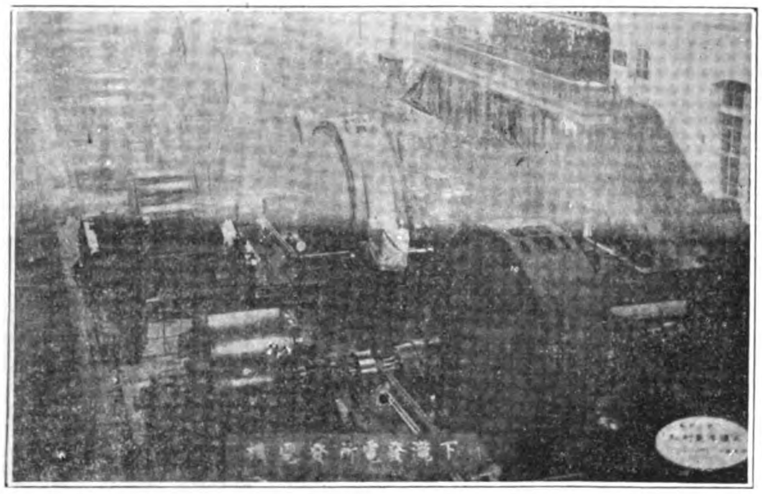
With the amalgamation of the Kansai Suiryoku Denki K.K., the property of the Nagoya Dento was overvalued by Y.16,160,000, about one-third of the total capital. There now exists a fairly big difference between the value of the property of the former Nagoya Dento and its properties in the amalgamation with the Kansai Suiryoku.

Since the completion of the merger in October last year, the Kansai Denki K.K. has absorbed the Chita Denki K.K. and the Tenryugawa Suiryoku Denki K.K. It is also announced that negotiations are now under way with the Yamashiro Suiryoku Denki K.K., the Hokusei Denki K.K., the Aiki Denki K.K., the Toki Suiryoku Denki K. K., the Kyushu Dento Tetsudo K.K., the Yawata Suiryoku Denki K.K., the Bishu Denki K.K. and the Nagoya Gasu K.K., having for their purpose the close co-operation, or eventual amalgamation into one organization of all these interests.

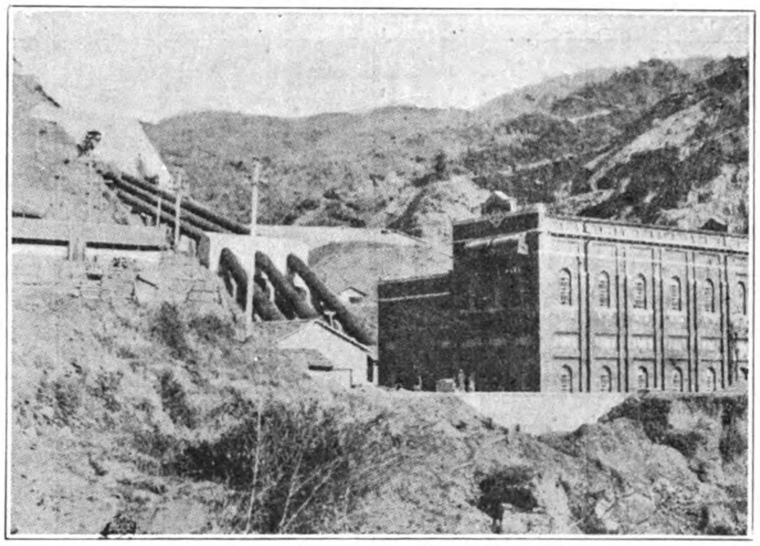
After absorbing the Chita Denki K.K. and the Hokusei Denki K.K., the Yawata Suiryoku Denki K.K. and the Bishu Denki K.K., the company will have increased its capital to Y.139,800,000, of which Y.99,990,000 will be paid up. It is evident that the properties of these four companies have been much overvalued, for the purpose of the amalgamation, the most ambitious of its kind in Japan to-day. After this capital increase is effected, the Kansai Denki K.K., will rank next in importance to the Tokyo Dento K.K., Japan's premier electric company. Comparing the proposed capital, of this combine with that of the Nagoya Dento in January, 1921 (Y.33,750,000, of which Y.21,000,000, only was paid up), the increase during the past eighteen months has been remarkable, almost Y.110,000,000. Such a rapid expansion of capital is unique in the history of Japanese industries.

As a result of all these mergers the Kansai Denki K.K., has added to the scope of its operations an electric railway, a gas plant and a factory for producing chemicals by electric processes. In the days of the Nagoya Dento its whole business was the supply of power. The area of its operations has, as a matter of course, expanded. They now cover the cities of Gifu, Toyohashi, Hamamatsu and Ise, in Yamato, but Nagoya still remains the centre of its business. It has also commenced to expand its operations in an entirely new field, the south of Japan, where it now owns properties covering the cities of Fukuoka, Sasebo, Nagasaki and Shimonoseki. In all, its business in both districts covers 16 cities, 101 towns and 567 villages. Only one company in Japan the Tokyo Dento covers a larger area.

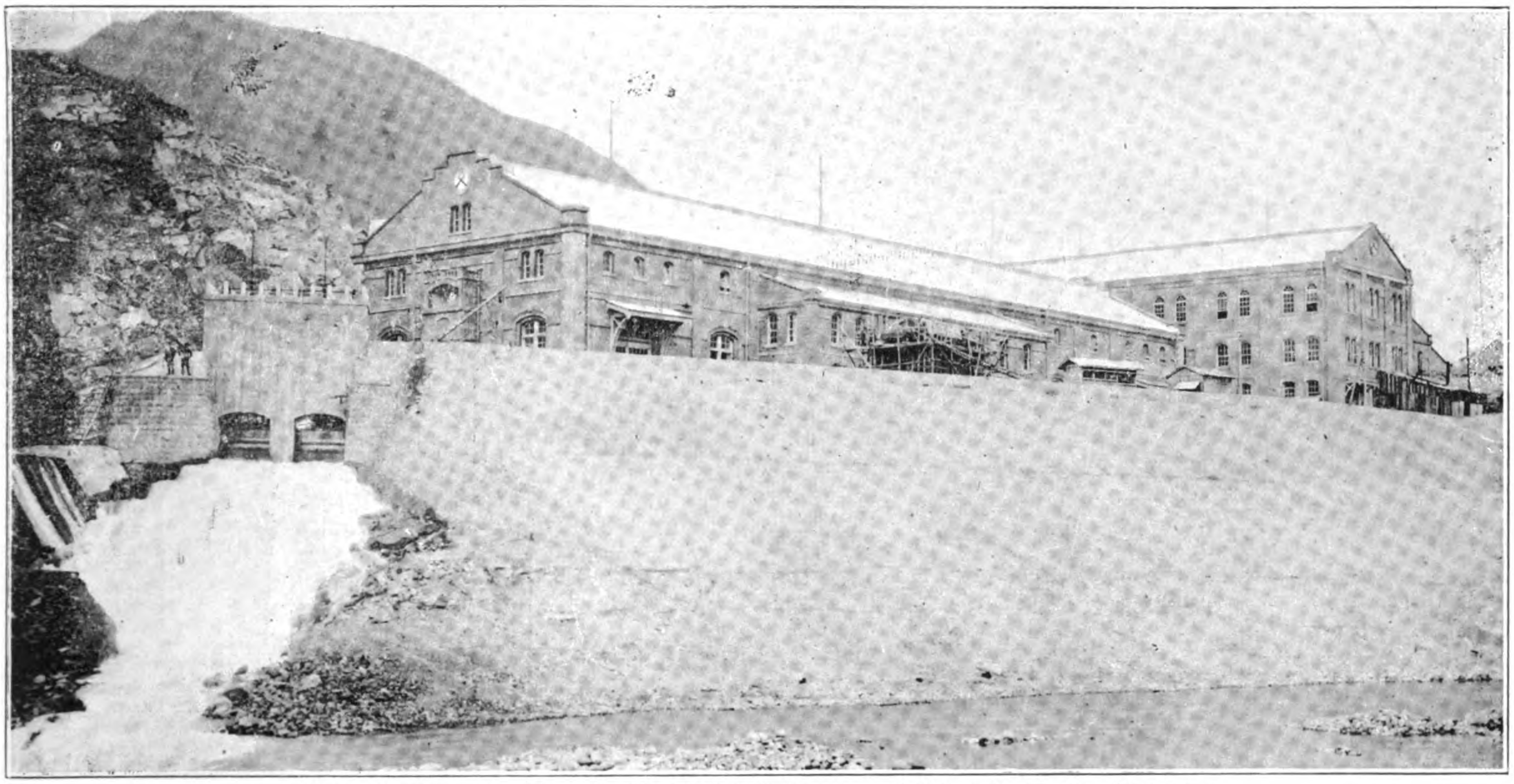
It is important to give some attention to the business of the Nagoya Dento in order to understand the present condition of the Kansai Denki.



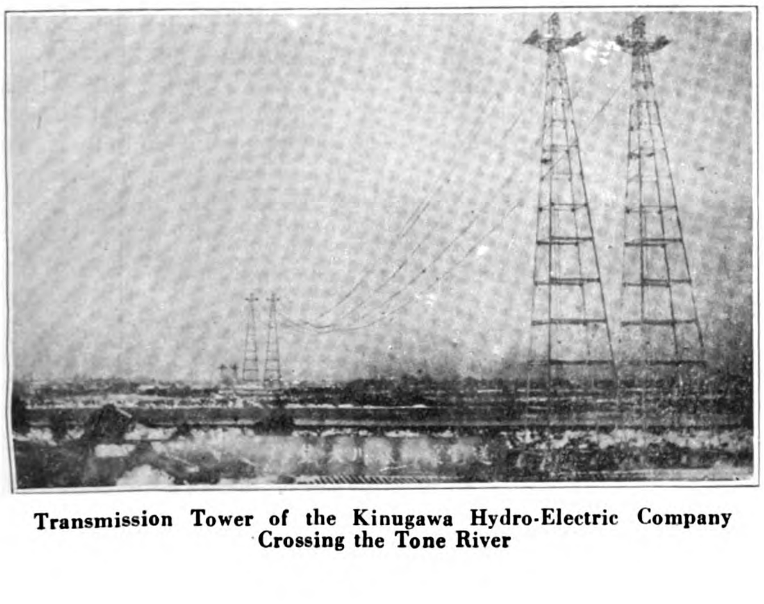
Interior of the Shinotake Power House of the Kinugawa Hydro-Electric Company



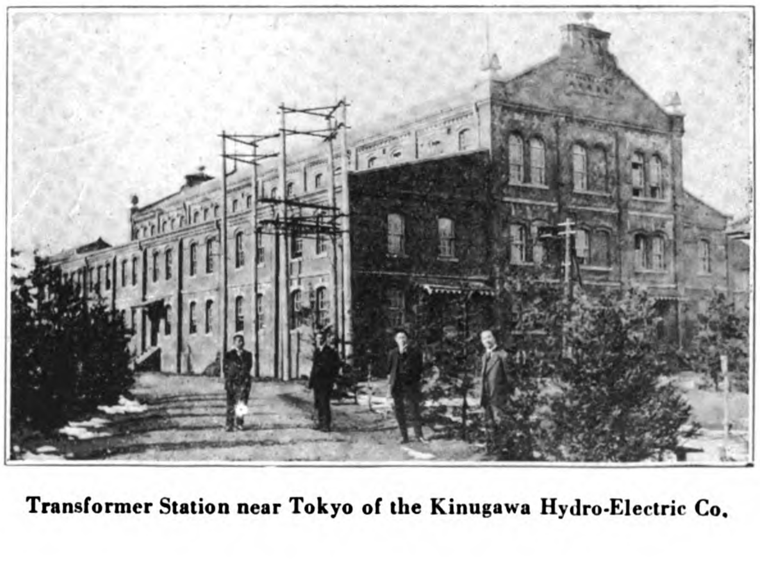
Wakayama Suiryoku Denki Kaisha, No. 2 Power Station on the Hidaka-Gawa



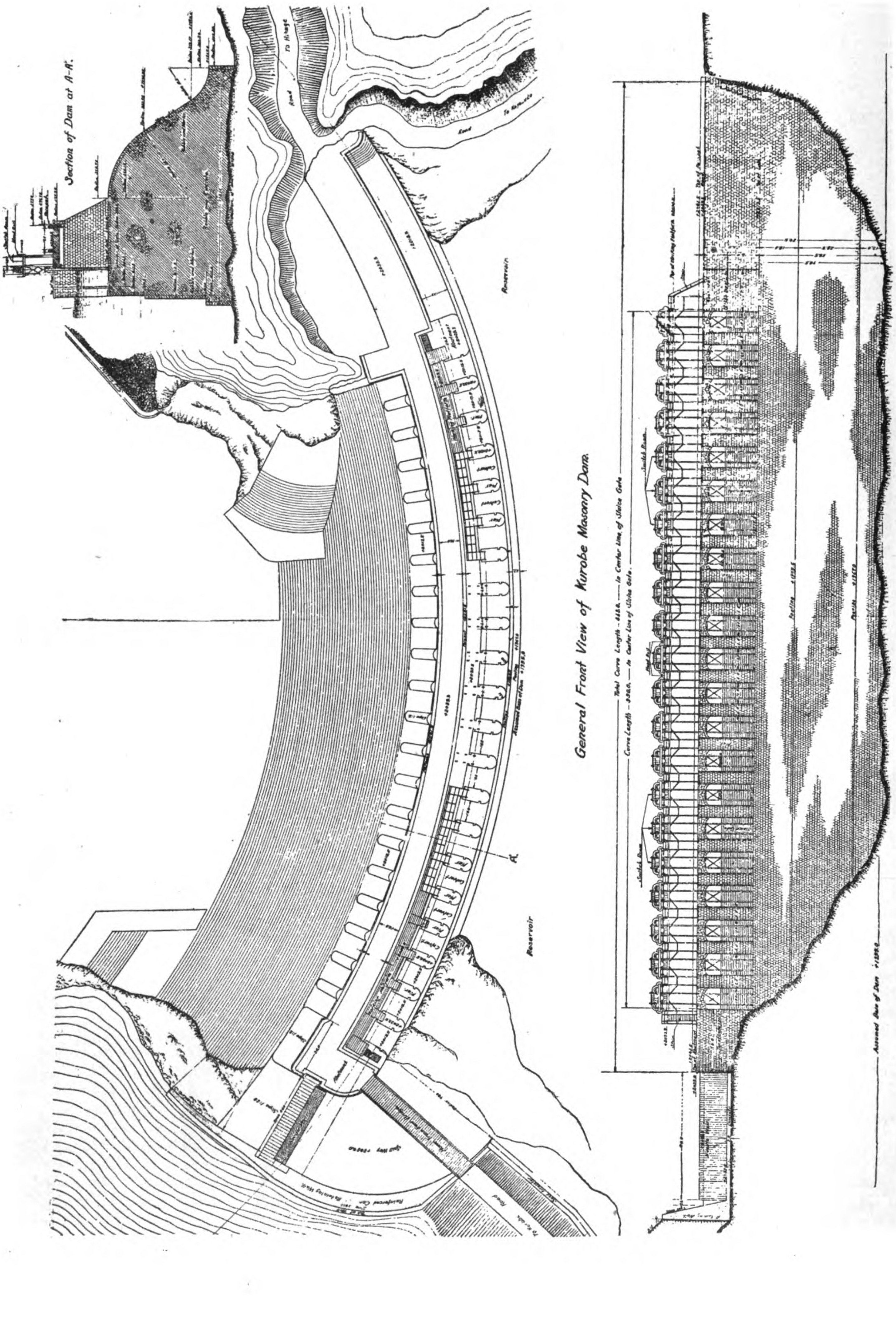
Power House of the Kinugawa Hydro-Electric Company at Shinotake, Tochigi Prefecture



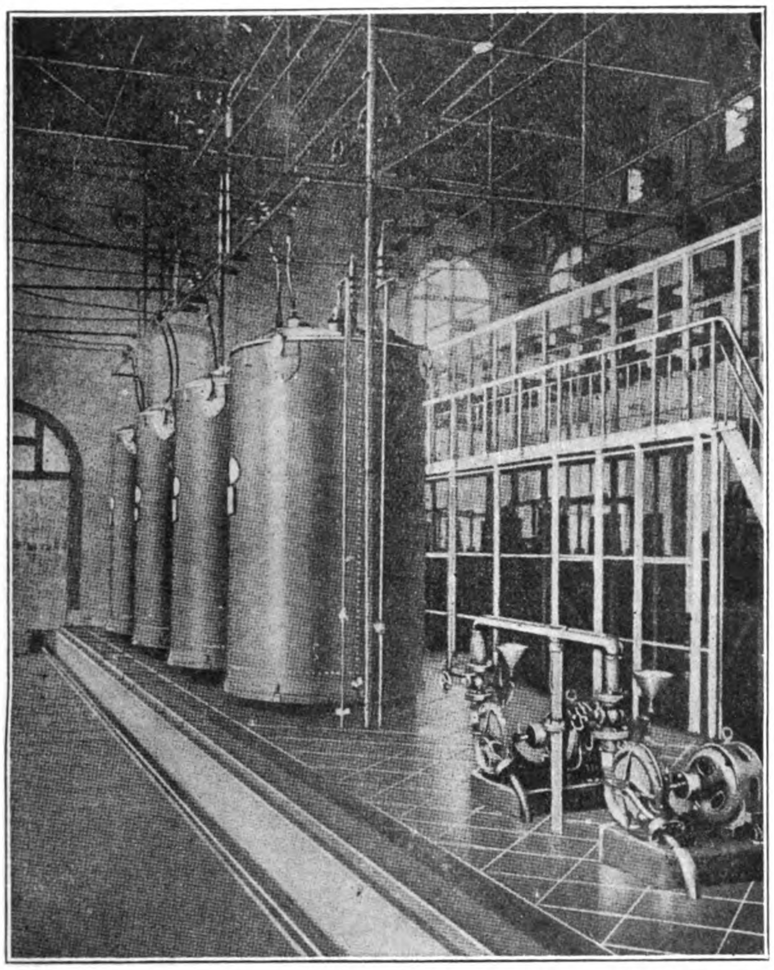
Transmission Tower of the Kinugawa Hydro-Electric Company Crossing the Tone River



Transformer Station near Tokyo of the Kinugawa Hydro-Electric Co.



GENERAL FRONT VIEW OF KUROBE MASONRY DAM OF THE KINUGAWA HYDRO-ELECTRIC CO., LTD.



1,800 KV-A. 60,000 V. Water Cooled Transformer; Komazawa Sub-Station of Fuji Gas Spinning Co., made by the Shibaura Engineering Works

The following table gives the working results of the Nagoya Dento K.K., from the second half of 1914, to and including the second half of 1921.

	Average Paid-up Capital	Amount of Profits	Rate of Profit to Paid-up Capital Per cent.	Dividend Rate Per cent.
1914—2nd half	Y.10,637,000	Y.498,000	9.3	8.
1915—1st half	10,637,000	544,000	10.1	8.5
1915—2nd half	10,637,000	547,000	10.3	8.5
1916—1st half	11,050,000	600,000	10.9	9.0
1916—2nd half	11,875,000	754,000	12.7	9.0
1917—1st half	11,875,000	885,000	14.9	10.0
1917—2nd half	12,511,000	985,000	15.7	11.0
1918—1st half	13,112,000	1,150,000	17.5	12.0
1918—2nd half	13,525,000	972,000	14.4	12.0
1919—1st half	13,525,000	1,048,000	15.5	12.0
1919—2nd half	14,762,000	1,405,000	19.0	18.0
1920—1st half	18,875,000	1,470,000	15.7	12.0
1920—2nd half	21,000,000	1,977,000	18.8	14.0
1921—1st half	28,426,000	3,440,000	24.2	20.0
1921—2nd half	44,596,000	3,800,000	17.0	14.0

(The 2nd half, 1921, figures are for the results of business of the Kansai Denki K.K.)

From these figures it can be seen that while before the war, the rate of profit was only slightly above 9 per cent., dividends were 8 per cent. As profit increased, however, its ratio was always greater than the rate of increase in the paid-up capital, consequently it was possible always to increase the dividend. The high dividend of 20 per cent. made in the first half of 1921, was due to the fact that a special dividend of 6 per cent. was distributed to commemorate the thirtieth year of the existence of the Nagoya Dento, and also as a result of the completion of the contracts for the amalgamation with the Kansai Suiryoku Denki K.K.

The continued prosperity of the business of the Nagoya Dento K.K., was due entirely to the increased demand for power which grew out of the industrial expansion of war years. Instead of building expensive power houses for its own use, the company purchased cheap power from others, and distributed it at an enormous profit. This policy was extremely clever at the time, as the company avoided the necessity of tying up a large amount of capital in construction work.

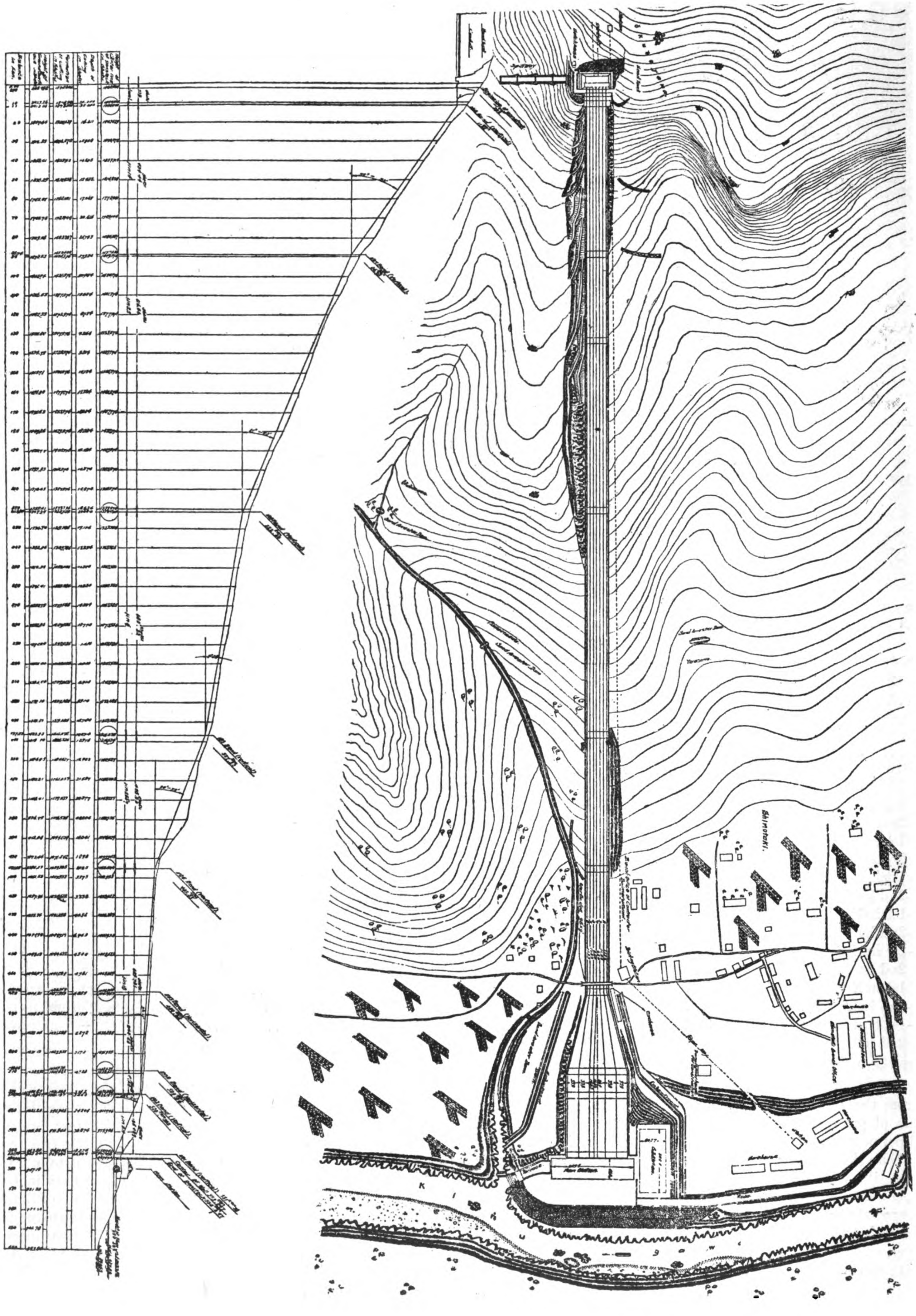
The following tables show the capacity of the power plants owned by the Nagoya Dento at the end of 1914 and at the end of 1920:—

	Dec. 31, 1914.		Dec. 31, 1920
Kisogawa Water Power	7,700 Kw.		—
Magaragawa Water Power	4,000 ,,		4,200 Kw.
Tomoegawa Water Power	750 ,,		750 ,,
Obara Water Power	200 ,,	Yaotsu Water Power	7,500 ,,
		Yaotsu Water Gate, Water Power ..	1,200 ,,
Total	12,650 Kw.	Total	13,650 K.w
Atsuta Coal Power	1,650 Kw.		10,000 Kw.
Lights converted into 10 candle power units	182,024 lights	712,681 lights	
Power sold ..	13,789 H.P.	44,938 H.P.	

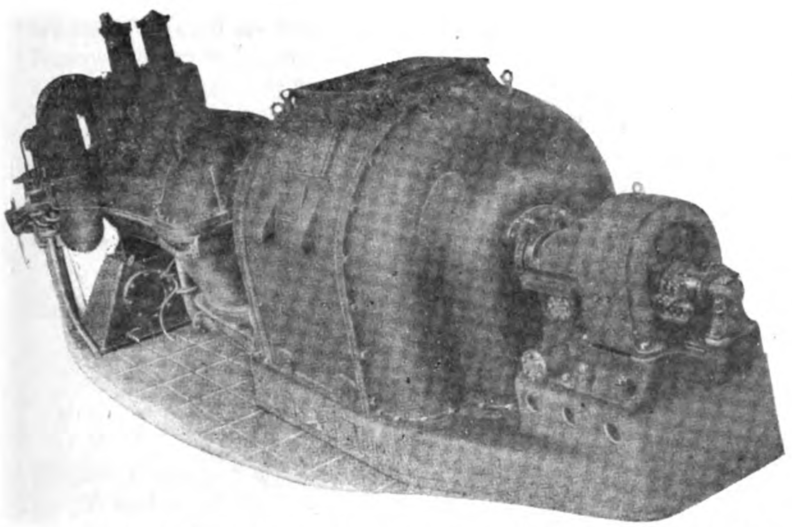
After the various amalgamations were carried out, eventuating in the organization of the Kansai Denki K.K., the power plants owned at the end of 1921 are shown in the following table:—

Yaotsu Water Power	7,500 Kilowatts
Yaotsu Water Gate, Water Power	1,200 ,,
Nagaragawa ,, ,, ...	4,200 ,,
Tomoegawa ,, ,, ...	750 ,,
Kasugawa No. 1 ,, ,, ...	350 ,,
,, No. 2 ,, ,, ...	800 ,,
,, No. 3 ,, ,, ...	1,800 ,,
Nagashino ,, ,, ...	750 ,,
Turi ,, ,, ...	500 ,,
Shiratani ,, ,, ...	1,500 ,,
Yasuge Nos. 1 & 2 ,, ,, ...	413 ,,
Kamibuchigawa ,, ,, ...	160 ,,
Misano ,, ,, ...	35 ,,
Nara No. 1 ,, ,, ...	200 ,,
,, No. 2 ,, ,, ...	900 ,,
,, No. 3 ,, ,, ...	200 ,,
,, No. 6 ,, ,, ...	197 ,,
Total	21,458 ,,
Atsuta Coal Power	10,000 ,,
Nara No. 4 ,, ,, ...	300 ,,
Nara No. 5 ,, ,, ...	1,500 ,,
Total	11,800 Kilowatts
Lights converted into 10 candle-power units ..	1,296,684
Power Sold	68,159 H.P.

Before the war the Nagoya Dento supplied only 182,000 ten candle power lights, and 13,700 h.p. for motive power, from a production of 12,650 kilowatts from water power, and 1,600 from coal burning plants, a total of 14,250 kilowatts. Six years later, at the end of 1920, the company was supplying 712,000 lights and 44,900 h.p. for motive power, using 13,650 kilowatts from water power and 10,000 kilowatts from the coal burning plants. Compared with pre-war days, the coal burning plant capacity increased 8,400 kilowatts, but water power only increased 1,000 kilowatts. The coal burning plant was only intended as a supplement to its water power operations, hence it was used as little as possible. But without using the capacity of the coal burning plant it was impossible to supply all the light and power wanted, so the Nagoya



A PLAN ANGLE OF SHIMODAKI HYDRAULIC POWER'S PIPE ROAD (KINUGAWA HYDRO-ELECTRIC CO. LTD.)



1,250 KVA. Turbo-Alternator Built for the Takashima Colliery, by the Nagasaki Works of the Mitsubishi Zosen Kaisha, Ltd.
1,250 KVA., 3 Phase, 50 Cycle,
3,300 Volt, 3,000 RPM., 80% PF.
With Direct-Coupled Exciter Compounded with Leakage Path

Dento purchased from the Kiso Denki Kogyo, some 12,600 kilowatts, at very low rates, in order to meet the demands made on it.

Ordinarily, it requires a large amount of capital to built generating stations which is unproductive during the course of construction and for some time after completion or until the entire capacity of the plant can be utilized. The Nagoya Dento by its policy of purchasing power from others avoided this difficulty and thereby enabled to increase its profits every term.

The first business term after the amalgamation closed at the end of 1921. The water power generated had increased to 21,400 kilowatts and the coal burning plants added 11,800 kilowatts. In addition to the total, (33,200 kilowatts) some 27,200 kilowatts were purchased from the Daido Dentyoku K.K., the Ihigawa Denki K.K. and the Yasaku Suiryoku Denki K.K. With this power 1,296,000 lights and 68,000 h.p. for motive power were supplied.

A casual consideration of the figures given is likely to raise some doubt of the purpose behind the successive amalgamations so hurriedly carried out by the Nagoya Dento after 1919. To get a good idea of the reason it is necessary to examine the progress of this company's expenditure on construction, which is given in the next table :

	Dec. 31, 1914.	Dec. 31, 1920.
Cost of Construction ; Water Power Plants	Y.8,007,440	Y.7,888,396
Cost of transmission lines	1,249,234	1,903,012
Total	Y.9,256,674	Y.9,791,408
Electric Light and Power Equipment :		
Transformer station construction expenses	Y.1,115,366	Y.1,588,070
Building distribution lines	1,765,925	4,079,769
Installations	1,564,982	1,564,982
Total	Y.4,446,273	Y.7,232,821
Cost of construction coal burning plant	764,022	1,189,440

At the end of 1921, these expenses itemize as follows :

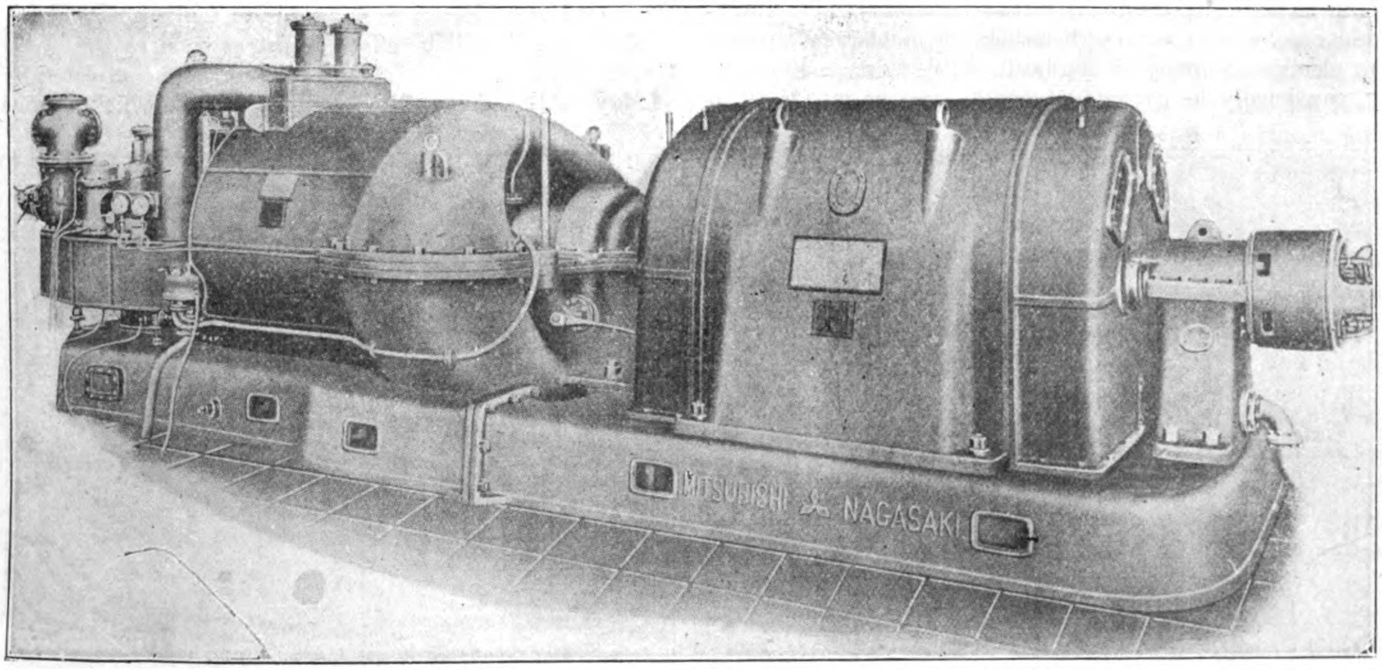
Cost of construction water power plants ..	Y.11,800,658
Cost of transmission lines	2,970,897
Total	Y.14,771,555
Electric light and power equipment:	
Transformer stations construction expenses..	Y. 3,254,590
Building distribution lines	16,568,539
Installations	3,763,504
Total...	Y.23,586,633
Cost of construction coal Burning plants ..	2,774,494

These figures are compiled by classifying the expenses published in the annual business reports. It is difficult, however, to know whether construction costs be high or low unless they are converted into some formula, such as the cost of construction per light supplied, or per kilowatt.

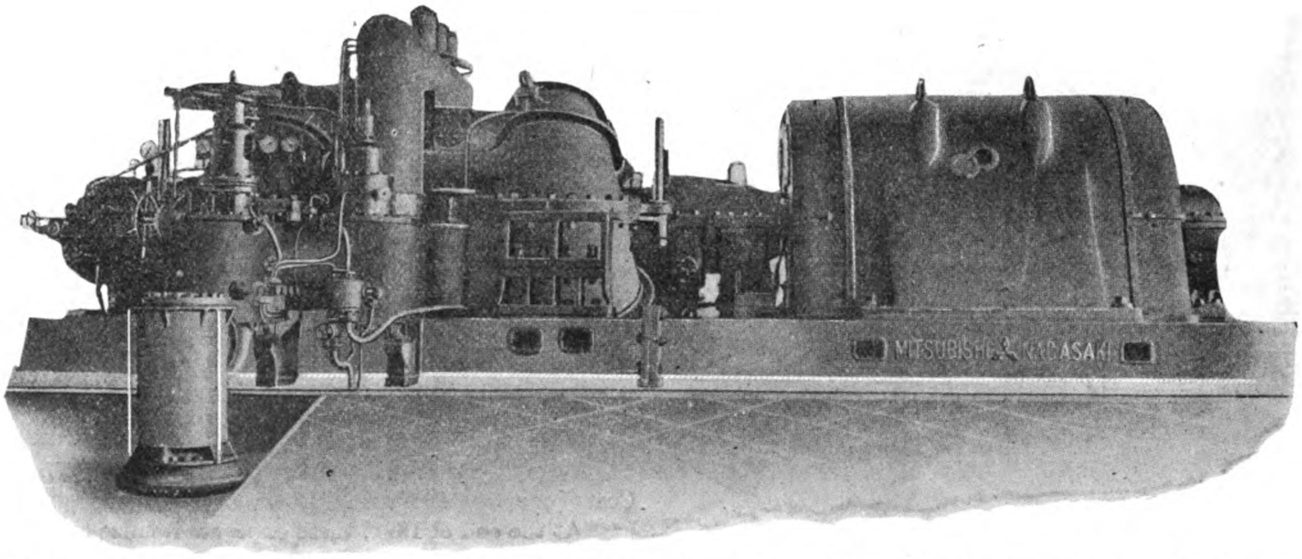
Estimating ten lights as equivalent to one kilowatt, the following table of cost of construction is obtained :—

	1914 Dec. 31	1920 Dec. 31	1921 Dec. 31
Water Power, 1 kilo. ..	Y.731,70	Y.717.30	Y.688.30
Coal Power	477.50	118.90	235.10
Per 10 c.p. light ..	11.80	6.20	11.90

From this table it appears as if there were but little difference in the costs of construction of the water power stations from 1914



3,750 KVA. Turbo-Alternator Built for the Nagoya Dento Kaisha, by the Nagasaki Works of the Mitsubishi Zosen Kaisha, Ltd.
3,750 KVA. 3 Phase, 60 Cycle,
11,000 Volt, 1,800 RPM., 80% PF.
With Direct-Coupled Exciter.



12,500 KVA., Turbo-Alternator Built for the Osaka Dento Kaisha, by the Nagasaki Works of the Mitsubishi Zosen Kaisha, Ltd.
12,500 KVA., 3 Phase, 60 Cycle.
11,000 Volt, 1,800 RPM., 80% PF.
One of 4 Sets

to 1920. In pre-war days, the total capacity of the water power plant. was 12,650 kilowatts. But actually not more than 54 per cent. of this amount was ever used. In 1920, the capacity of these plants had increased to 13,650 kilowatts, but the amount utilized had increased to more than 80 per cent. Although the difference in the cost of construction between 1914 and 1920 was therefore very slight, there was a great increase in the volume of power used.

The increased profits from year to year enabled the company to write off large amounts for replacements. The great decrease in the cost of the coal burning equipment may accordingly be due to the fact that the company wrote off larger amounts for this station than for its water power plants, because it was used only as a reserve supply of power, and consequently its cost of construction was much out of line with its income return.

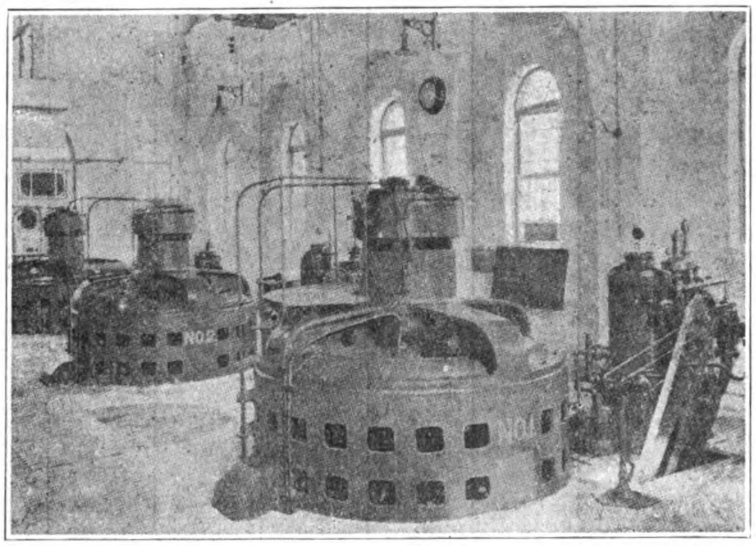
Installations for light and power were increasingly active. Many new customers were obtained who did not need poles erected to ensure their supply. This naturally greatly assisted in bringing down the cost per 10 candle power light supplied.

Examining the company's construction expenses in this manner it becomes apparent that its profits have been enormous. Even paying 14 per cent. dividends it has been possible to retain large amounts as reserves, or to utilize them for machinery replacement. An electric company whose business, is more or less of a monopoly, can hardly be expected to make greater profits or to pay higher dividends than the Nagoya Dento K.K., in the period before its amalgamation with the Kansai Suiryoku Denki K.K.

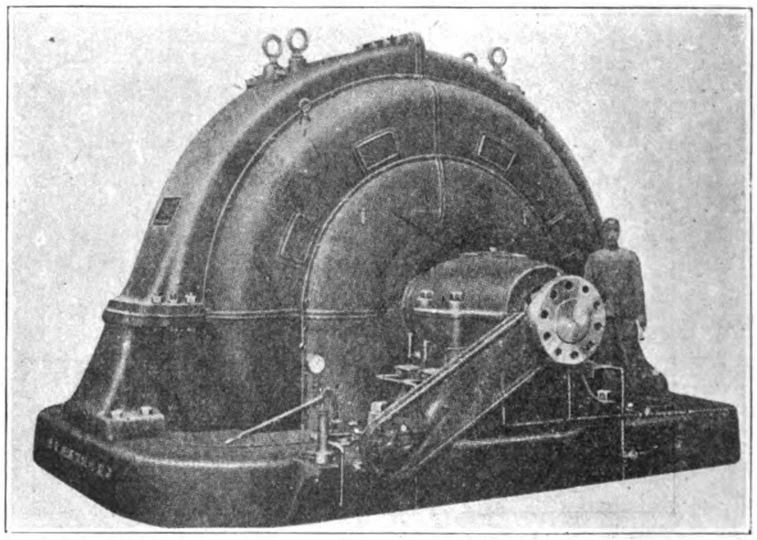
With such extremely high profit rates the company began to be bothered with complaints that its charges were too high and many attempts were made to obtain official action to lower the rates for light and power supply. In this condition of affairs, the Nagoya Dento began to look around for possible amalgamations which would cut down the percentage of its fixed capital compared to its paid up capital, to some such low point as in pre-war days. The amalgamation with the Kansai Denryoku K.K., was the result.

As a result of this amalgamation at the end of 1921, the fixed capital, or cost of construction, was cut to Y.688.00 per kilowatt, of water power, to Y.235.00 per kilowatt of coal power and the cost of one light was increased to Y.11.90. The purpose of the amalgamation, it can hardly be doubted, was to decrease the income-earning value of the Nagoya Dento. The pre-war figures of cost have evidently been taken as the standard, so the result of the depreciation can not be considered in too unfavorable a light.

The Kansai Denki K.K., plans to make many other amalgamations, which will be effected just as soon as the government's license can be obtained. Many of them were completed by the end of May, 1922. Some of the companies with which amalgamations



Threc 1,875 K.V.A. 11,500 Volt 500 R.P.M. 50 Cycle Vertical Shaft Generators built by the Shibaura Engineering Works for the Wakayama Hydro-Electric Co.



6,666 K.V.A. 6,600 Volt 375 R.P.M. 50 Cycle Generator, Enclosed-Ventilated for the Inawasiro Suiryoku Denki Kaisha built by the Shibaura Engineering Works

are to be effected are almost as important financially as the former Nagoya Dento K.K., the Kyushu Dento Tetsudo K.K., in especial, being one of these. It is natural then that the capital of the Kansai Denki will be increased.

It is reported that on amalgamation the Hokusei Denki K.K. will receive 13/3/10 shares of the Kansai Denki K.K., for each ten shares of its old issues. While the Yawata Suiryoku will receive two for one and the Bishu Denki 13 for 10.

On the basis of these amalgamations the fixed capital of the Kansai Denki at the end of May, 1922 ought to be :

Cost of construction, water power plants ..	Y.18,410,767
Cost of transmission lines	5,621,141
Total	Y24,031,908
Electric Light and Power Equipment :	
Transformer stations, construction expenses	4,567,068
Transmission lines and installations.. ..	32,983,640
Total	Y.37,950,708
Cost of construction, coal-burning plants ..	Y.12,412,194

Compared with the end of 1921, this is an increase of Y.33,-260,000.

When the amalgamations are completed, the company's power plants will be :

Water power plants	37,678 kilowatts
Coal burning plants	46,850 ,,
Lights, converted into 10 candle power units	2,500,617 lights
Power sold	107,991 H.P.

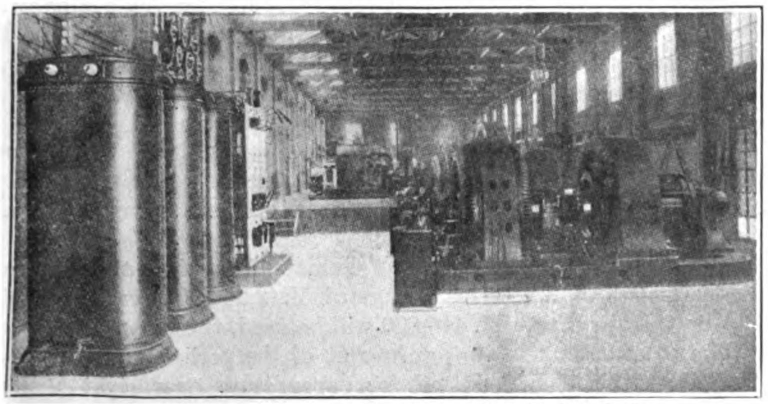
An increase in water power capacity of 16,200 kilowatts will be one of the results of the amalgamation, as the Kawakami River, Kyushu and several other large power plants will be added to its equipment. The capacity of the coal burning plants will be increased by the addition of plants at Maeda, Najima and Nagasaki.

The number of lights will be increased by about 50 per cent., reaching 2,500,000 in all ; while the power sold will increase 60 per cent. to 107,000 h.p.

Compared to the end of 1921, the cost per unit of power will be as follows :

	Dec. 31, 1921.	Dec. 31, 1922.	Increase or decrease
Water power, 1 kilo.	Y.688.30	Y.637.80	Dec. Y.50.50
Coal power, 1 kilo.	235.10	264.90	Inc. 29.80
Per 10 c.p. light ..	11.90	10.60	Dec. 1.30

The increased cost of the coal power units is due to the amalgamation with the Kyushu Dento Tetsudo K.K., with its coal burning plants at Najima and Nagasaki.



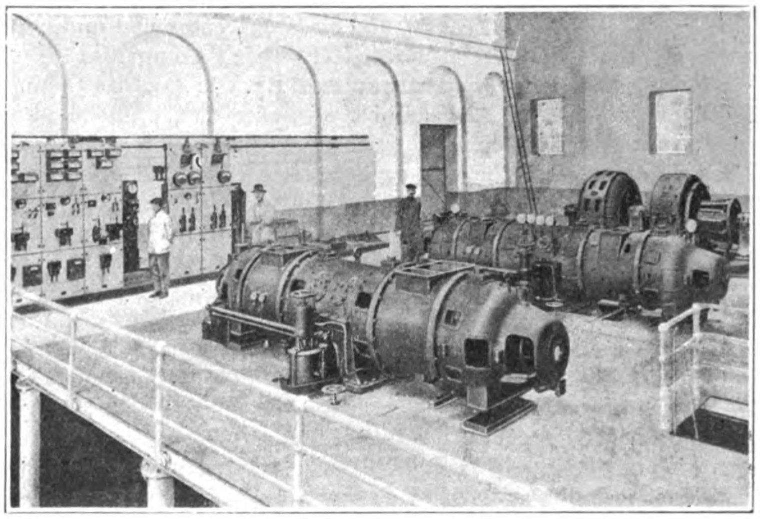
No. 1 Power House of the Kobe Mitsubishi Works

The Najima power plant is built in the outskirts of the city of Fukuoka. The site is larger than is at present necessary, but it is capable of expansion without great expense.

The installations of these newly amalgamated concerns were all war purchases, so they are relatively expensive. Consequently the cost per kilowatt for coal power plants has increased Y.30.00 by these recent amalgamations.

But the cost of light and water power units has been materially lowered, which proves that the Kansai is bettered by making these amalgamations.

After making the amalgamations with the Kyushu Dento Tetsudo, the Bishu Denki, the Yawata Suiryoku and the Hokusei



No. 2 Power House of the Kobe Mitsubishi Works: Turbo-Generating Sets made by the Mitsubishi Works

Denki, the Nagoya Gas Co., will be absorbed. This will complete the planned amalgamations for the present.

At present the Kansai Denki K.K., holds some 524,000 shares of the Daido Denryoku K.K., amounting to Y.26,000,000 on which Y.12,000,000 has been paid up. It still is liable for Y.14,000,-000 to be paid the Daido Debryoku. It is also liable for some Y.3,000,000 to be paid the Nohi Denki K.K. and the Gifu Kogyo K.K., in which it holds investments also. On its investments it receives about 8 per cent. a year.

Should the Kansai Denki resort to making calls on its unpaid capital in order to meet its obligations to others when they become due, it may be difficult to continue paying 13 per cent. dividends. It is, accordingly, said that company plans to issue debentures for the amount of its obligations to others, because debentures can easily be floated at 9 per cent., thus effecting a saving on earnings.

It may therefore be taken for granted that the Kansai Denki K.K., will continue its career of expansion without detriment to the profits it has been paying its shareholders.

Japan's Iron and Steel Production in 1921

According to a report of the imperial department of agriculture and commerce, the production of iron and steel in Japan during 1921 was considerably decreased, although on the whole the results of production were good. There are now signs of recovery in Manchuria and Chosen.

Production 1921.	Japan Proper	Chosen	Manchuria	Total
Pig iron	476,127 tons	83,010	93,951	653,088
Iron and steel alloys ..	7,574	—	—	7,574
Charcoal steel ..	764,551	51,016		816,167
High speed steels ..	20,444	—	—	20,444
Raw material for making charcoal steel ..	479,783	30,026	—	509,809
Forged steel	101,724	—	—	101,724
Others	68	—	—	68

Japanese Engineering Notes

Rail and Tramway Combines

THE Morioka Electric Industrial Co. and the Onsen Tramway Co. were amalgamated on May 1. The Ise Electric Railway Co., Tsu Electric Light Co. and the Matsuzaka Electric Co. were voluntarily dissolved on April 30, and on May 1 combined under the name of the Mie Amalgamated Electric Companies Ltd. On May 8, 1922, the Iyo Railway and Electric Co., the Ehime Hydro-Electric Co., the Kawakami Hydro-Electric Co. combined in order to finance the increased business of the Iyo Tetsudo Denki K.K. The capital of the new organization will be increased to Y. 16,500,000.

Official approval has been obtained for the amalgamation of the Yoro Tetsudo K.K. (Yoro Railway Co., Ltd.) with the Ihigawa Denki K.K. (Ihigawa Electric Co., Ltd.) and for an increase of capital to Y. 10,000,000. On May 15, 1922, the amalgamation of the Kyushu Dento Tetsudo K.K. (Kyushu Electric Light and Railway Co., Ltd.) with the Kansai Denki K.K. (Kansai Electric Co., Ltd.) was announced. The Kansai Denki will increase its capital to Y. 133,041,200 as a result of this and previous amalgamations with the Hokusei Denki K.K., the Aiki Denki Kogyo K.K. (Aiki Electric Industry Co., Ltd.), the Tokyo Suiryoku Denki K.K. the Yahata Suiryoku Denki K.K. and the Bishu Denki K.K. The Sunen Denki K.K. absorbed the Hagoromo Seihyo K.K. (Haoromo Ice Manufacturing Co., Ltd.) and the Abe Denki K.K. on May 26, 1922 and its capital increased to Y. 3,550,000.

The Hokkaido Seito K.K. (Hokkaido Beet Sugar Co., Ltd.) operates for its own use 2 miles and 22 chains of light railway between Obihiro Machi, Kawanishi Bu, Tokachi Hokkaido and Taisho Mura. The line is standard Japanese gauge 3 feet 6 inches. These lines were recently licensed to carry freight and passengers for the general public and are now under the operation of the local railways law. The cost of construction of this short line was Y. 149,702. The capital of the company is Y. 10,000,000.

The Keihan Denki Tetsudo K.K. (Kyoto-Osaka Electric Railway Co.) was originally licensed under the provisions of the tramway construction law. The line is electrically operated between Hamura, Honjo, Kita Ku, Osaka city and Omiya-machi, Shijo, Nishi Ku and Kyoto city, a distance of 27 miles and 20 chains. The gauge is 4 feet 8½ inches. The capital of the company is Y. 36,000,000 and the cost of construction is Y. 25,000,000. The company was recently obliged to change its license and become a local railway.

CAPITAL INCREASES.—The Shiratana Tetsudo K.K., operating between Shirakawa-machi and Tanakura-machi, 14 miles, 51 chains, on November 30, 1921, applied for official sanction to increase its cost of construction to Y. 700,000. The approval was obtained in May.

The Akao Tetsudo K.K., operating between Shiohama and Aritoshi on April 30, 1922, has increased its cost of construction to Y. 750,000. The following companies have increased their capital; the Hokuso Tetsudo K.K., to Y. 1,500,000, the Hase Tetsudo K.K., to Y. 150,000, the Jinchu Tetsudo K.K., to Y. 700,000, the Chichibo Tetsudo K.K., to Y. 1,000,000 and the Osaka Tetsudo K.K., to Y. 3,000,000.

New Railway Lines

The following new railway lines were opened to business between April 1 and May 31, 1922 :—

Gojome Tetsudo K.K., from Gojome to Goji, 2 miles, 31 chains ; Chikuma Tetsudo K.K., from Hata to Shinmura, 3 miles ; Sagami Tetsudo K.K., from Samukawa to Higashi Shinomiya, 1.2 miles ; Osaka City Electric Railway Department, from Kobayashi-machi to Tsurumachi 4 chome, 1 mile, 6 chains ; Ikoma City Electric Railway Co., Ltd., from Oji to Yamashita, ½ mile, from Yamashita to Shigiyama, 1.1 mile ; Osaka City Electric Railway Department, from Shikajima-machi to Shimaya-machi, 1 mile, 53 chains ; Tokyo City Electric Bureau, from Shibuya-machi to Nakashibuya, 6 chains ; Chichibu Tetsudo K.K., Kagemori to Buko, ¼ mile, Kunigami to Arakawa ⅝ miles.

WATER POWER SITES.—According to a report of the department of communications there are 1,126 sites available for development of hydro-electric power in Japan. There are eight rivers yielding more than 100,000 h.p. each, with 68 sites with a potential power of more than 10,000 kilowatts. It was expected to complete details of the investigation before the end of March, 1923, but owing to lack of funds the survey has been suspended this year.

TRAMWAY FOR SENDAI AND TOYOHASHI.—A survey for tramways is Sendai has been finished, and a company will soon be licensed to undertake construction. The city of Toyohashi, in Aichi prefecture, is also considering a street railway system to be operated by the municipality.

ELECTRIC RAILWAY MERGER.—The Nankai Tetsudo K.K. (Nankai Railway Co., Ltd.), the Osaka Koya Tetsudo K.K. (Osaka Koya Railway Co., Ltd.) and the Koya Daishi Tetsudo K.K. (Koya Daishi Railway Co., Ltd.), effected a merger with a capital investment of Y. 50,000,000. It now practically controls private railway transportation in the district south of Osaka and around Wakayama.

KUHARA SEEKS POWER SITES.—The Kuhara Kogyo K.K. (Kuhara Mining Co., Ltd.), a pioneer in the use of electric power for mining operations in Japan, has turned its attention to developing water power along with its mining projects and has recently secured power rights to more than 70,000 kilowatts. As soon as official licenses are obtained, these will be developed, and power houses erected. Two more sites, one to develope 20,000 kilowatts and the other 50,000 kilowatts, have been applied for.

JAPANESE ELECTRIC LAMPS FOR SIBERIA.—The demand for electric bulbs is gradually increasing in Manchuria and Siberia. The Japanese bulbs are in demand in those territories where cheapness of price is more desired than quality. Japanese merchants are looking forward to increased sales in these territories and are taking steps to improve the quality of their products. About 1,000,000 bulbs a month are now shipped from Japan to these districts.

OSAKA MUNICIPALITY TO PURCHASE OSAKA DENTO.—It is reported that the Osaka municipality is making preparations to purchase the business and equipment of the Osaka Electric Light Co., Ltd. The basis of the purchase price will be the company's cost of construction, plus a compensation to be determined. Since the plan to purchase was decided upon, the light company has greatly expanded its business, but the municipality is determined to make the purchase at any cost.

HARBOR CONSTRUCTION IN JAPAN.—The engineering bureau of the home department has allocated the funds voted at the last session of the diet for the improvement of the harbors at Takamatsu, Tsuruga and Sakai.

For the improvements at Takamatsu covering a period of five years beginning 1922, a sum of Y. 2,200,000 was granted. During this fiscal year Y. 415,000 will be used, the balance in more or less equal amounts during the rest of the period. At Tsuruga Y. 3,400,000 will be allotted for expenditure over eight years. During the present year Y. 110,000 will be used. From 1922 to 1927 a sum of Y. 1,800,000 will be spent at Sakai.

CEMENT MERGER.—The Toyokuni Cement Co., Ltd., of Fukuoka city, with a capital of Y. 5,000,000 ; Y. 1,750,000 paid up, has been merged with the Nagoya Cement Co., Ltd., of Nagoya city, capital,

Y. 2,000,000; paid up, Y. 500,000 and the Saga Cement Co., Ltd., of Saga prefecture, capital, Y. 800,000, all paid up, the Nagoya Cement Co., called up a payment of Y. 10.00 per share on its outstanding unpaid capital and the Toyokuni took over both the other companies with all their debts and property as they stood on June 1, 1922. The capital of the Toyokuni Cement Co., Ltd., has accordingly been increased to Y. 7,500,000 and for the increase of Y. 2,500,000, fifty thousand shares of new stock have been issued. A bonus was paid to the employees and directors of the two merged companies.

Japan Electric Power Co.

The new 24,000 kw. Seto power plant of this company will be completed this year. This company now purchases 26,000 kilowatts from others. When the new plant is completed it will have 50,000 kilowatts of power to distribute in the Osaka district.

Ujigawa Electric Co.

On reclaimed harbor land owned by the municipality of Osaka, the Ujigawa Denki K.K., plans to erect a new coal-burning power plant, at the juncture of the Kitsugawa and the Kitsu river canal. The site, 16,000 *tsubo* (576,000 sq. ft.) is leased for thirty years at 12 sen per *tsubo* per year, with a slight rise in rental each five years.

Fuji Hydro-Electric Co.

The Fuji Hydro-Electric Co., Ltd. has issued Y. 3,000,000 of debentures through the Yasuda Ginko of which Y. 2,000,000 is to redeem outstanding indebtedness, and Y. 1,000,000 for installing 16 miles of transmission wires between Numadzu and Kozu and a new transformer station at Atsugi-machi, to supply light and power in that part of Kanagawa prefecture.

Kyushu Hydro-Electric Co.

On June 1, 1922, the last payment of capital amounting to Y. 12.50 a share, a total of Y. 4,900,000 was called up by the Kyushu Suiryoku Denki K.K., to redeem outstanding debts and debentures. The Mitsui interests will receive Y. 3,000,000 and debentures amounting to Y. 1,200,000 redeemed. This company now has under construction hydro-electric power plants at Oyama, Imahata and Chinda and a coal-burning plant at Fukuoka city. For these four plants Y. 4,500,000 to Y. 5,000,000 is needed. Another power plant not yet commenced requires another large sum. Before these plants can be completed, it will be necessary to double the existing capital at a proper opportunity. Present capital is Y. 37,400,000, all paid up.

Nankai Hydro-Electric Co.

The Nankai Hydro-Electric Power Co., Ltd. (address 1030 Hikata-machi, Kaiso-gun, Wakayama prefecture) has decided to increase its capital of Y. 1,000,000 to Y. 2,500,000 and to call up the first payment on August 1, 1922. This company owns the following power plants :

1. Kamimatsubara, Ishigaki Mura, Arita Gun, Wakayama Prefecture, on the Arita River. This plant is now under construction to generate 350 kilowatts, with a high-tension voltage of 11,500.
2. Surigawa, Ishigaki-mura, Arita-gun, Wakayama prefecture, on the Arita River. The 200 kilowatt power generated by this plant is used for a reserve supply. High-tension voltage of 3,450.
3. Coal-burning plant. Nadaka, Uchimi-mura, Kaiso-gun, Wakayama prefecture. This 300 kilowatt plant is now under construction and its power will be used for reserve. High-tension voltage of 3,450.
4. Kawaguchi, Iwakura-mura, Arita-gun, Wakayama prefecture, on the Arita River. This 500 kilowatt plant is now under construction, 3,450 volt.
5. Numa, Yahata-mura, Arita-gun, Wakayama prefecture, on the Arita River, also under construction to produce 1,450 kilowatts.
6. Uses power purchased from the Wakayama Suiryoku Denki K.K., 575 kilowatts.
7. Uses power purchased from the Hitakagawa Suiryoku Denki K.K., 250 kilowatts.

The total power generated and purchased is 825 kilowatts; under construction, 2,300 kilowatts ; reserve, 200 kilowatts and under construction, 300 kilowatts. Besides these power plants operating and under construction this company owns four transformer stations. The Nankai Suiryoku Denki K.K. was established in June, 1904 and began business in 1910. It supplies light and power in Kaiso-gun, Naka-gun, Arita-gun and Kaiso-gun in Wakayama prefecture, to four towns and 27 villages and the power for the Nogami light railway company.

The officers are : President : Ichirobei Kamiyama ; Managing Director : Shichiroeimon Gozen ; Directors : K. Gozen and Z. Morita ; Chief Engineer : N. Fujii.

Electrical Companies Combine

The Tsu Dento K.K. (Tsu Electric Light Co., Ltd.), capital, Y. 2,000,000; paid up, Y. 1,500,000 ; the Matsuzaka Suiryoku Denki K.K. (Matsuzaka Hydro-Electric Power Co., Ltd.), capital, Y. 2,000,000 ; paid up, Y. 1,025,000 and the Ise Denki Tetsudo K.K. (Ise Electric Railway Co., Ltd.), capital, Y. 4,000,000; paid up, Y. 2,050,000, have received permission to amalgamate.

The capital of the new company will be Y. 12,500,000. The Tsu Dento K.K. owns one hydro-electric power plant and three coal-burning plants, producing a total of 940 kilowatts. It has under construction, one hydro-electric and one gas-burning power plant to generate 448 kilowatts.

The Matsuzaka Suiryoku Denki K.K. owns and operates one hydro-electric, one coal burning and two gas-power plants, generating 875 kilowatts. It also has under construction one hydro-electric power plant to generate 700 kilowatts.

The Ise Denki Tetsudo K.K. owns one coal-burning and one gas-power plant, generating 485 kilowatts. It also has under construction one hydro-electric plant to generate 832 kilowatts and another projected plant to utilize 1,000 kilowatts, which it planned to purchase from the Mie Kyodo Denryoku. The power for this plant will, however, now be supplied by other members of the new amalgamation.

Tokushima Hydro-Electric Co.

At the end of 1921 the Tokushima Suiryoku Denki K.K. (Tokushima Hydro-Electric Electric Power Co., Ltd.) has annexed three small companies, the Fukura Dento K.K. (Fukura Electric Light Co., Ltd.), the Yura Dento K.K., (Yura Electric Light Co., Ltd.) and the Awaji Denki K.K. (Awaji Electric Co., Ltd.)

It recently absorbed the Sotanigawa Suiryoku K.K., capitalized at Y.4,000,000. The capital of the Tokushima Suiden Y.7,250,000, will be increased to Y. 12,000,000. The Tokushima Suiden owns two hydro-electric power plants generating 1,800 kilowatts and one under construction to generate 730 kilowatts ; two coal-burning plants, for reserve power, now generating 950 kilowatts. It also purchases from the Fukushima Boseki K.K., 500 kilowatts ; a total actual generating output of 2,300 kilowatts, with 730 under construction. The Sotanigawa Suiryoku Denki K.K. owns four hydro-electric power plants in operation, generating 2,766 kilowatts.

SAKUSAWA ELECTRIC RAILWAY.—A new electric railway between Tanaka station on the Shinyetsu line of the Imperial Government Railways, and Kayano station of the Chuo line of the Imperial Government Railways, a distance of 35 miles, will be built by a new company, called Sakusuwa Denki Tetsudo K.K. (Sakusuwa Electric Railway Co., Ltd.), capitalized at Y. 500,000. The first call of Y.50,000, one-tenth of the total, has already been paid in.

This line passes through a district of summer resorts and hot springs rich in natural products. The Imperial Government Railways will bring large numbers of passengers to its terminals, ensuring the prosperity of the line.

South Osaka Electric Railway

The imperial government department of railways has granted permission to the South Osaka Electric Railway Co., Ltd. to begin construction of the first part of its line between Sakai city and Takada in Yamato province, nineteen miles and some chains. Work will be begun in the very near future.

Tsukushi Electric Railway

The Tsukushi Electric Railway Co., Ltd., operating between Kurume and Fukuoka, in Fukuoka prefecture, Kyushu, a distance of 24 miles, double track, gauge 4 feet 8½ inches, has decided to use the latest type of high-speed tram car. These cars will carry 80 passengers and travel at a speed of 50 miles and hour, which is faster than any steam line in this country. The distance between Kurume and Fukuoka, with stops, will be covered in 50 minutes.

Electrification of Yoro Railway

The Yoro Tetsudo K.K., which operated 35.8 miles of steam railway (gauge 3 feet 6 inches, weight of rails 45-lbs.), between Ihi and Kuwana in Gifu prefecture, amalgamated with the Ihi River Electric Co., Ltd. on June 1, 1922. The Yoro Tetsudo K.K. was capitalized at Y. 5,000,000 and the cost of its lines to March 31, 1922, was Y. 3,200,000. The Ihigawa Denki K.K. owns two hydro-electric power plants in operation, generating 11,900 kilowatts and has under construction another hydro-electric plant to generate 3,000 kilowatts. It also has a coal-burning plant held in reserve with 1,250 kilowatts. It was capitalized at Y. 10,000,000; paid up, Y. 6,250,000, and loans outstanding, June 30, 1921, of Y.6,893,381. Its address is Shintomi Cho, Kyobashi Ku, Tokyo.

In effecting the amalgamation, the capital of the Ihigawa was paid up to the amount of Y. 8,000,000 and the Y. 4,000,000, of the Yoro Tetsudo added to it to make the capitalization of Y. 12,000,000. The total capital, now paid up, is Y.10,000,000. The new company will complete the construction of the Hirosegawa power plant of the Ihigawa Co., and the steam line of the Yoro Tetsudo will be electrified. In addition, the projected railway line between Kuwana and Yokkaichi will be completed and electrified. To carry out these plans the capital of the amalgamation will be increased to Y. 20,000,000 during this year.

Ikoma Electric Railway

The Ikoma Electric Railway Co., Ltd., has completed the first section of its line between Oji and Shinkizan, 1 mile, 5 chains. The second section between Shinkizan and Ikoma will be completed in 1924. The first section is a mountain line, operated by cable. The section still unbuilt is on a level bed and will be operated by electricity.

Nankai Railway

The Nankai Tetsudo K.K. (Nankai Railway Co., Ltd.) will construct a double track along a large part of its line south of Koshizan, between Osaka and Wakayama. In order to obtain funds for this construction, the present capitalization will be increased to Y. 44,000,000.

Mitsui Electric Railway

The Mitsui Denki Tetsudo K.K. (Mitsui Electric Railway Co., Ltd.) operates 20 miles of electric railway between Amaki-machi, Asakura-gun, and Fukushima-machi, Yame-gun, in Fukuoka prefecture, passing through Kurume city. It also supplies light and power in the zone of the railway. Its capital is Y. 2,000 000 ; paid up, Y. 1,250,000. The line will shortly be extended from Amaki to Iidamachi, Tagawa-gun, Fukuoka prefecture, 3 miles, and a branch line constructed from Okuma-machi to Iizuka-machi, Kaho-gun, 7 miles. The line is 4 feet 8½ inch gauge. The company owns 16 cars. It obtains its power from the Kyushu Dento Tetsudo K.K. and the Kyushu Suiryoku Denki K.K., 350 kilowatts in all.

New Electric Companies

1. Yamatake Dento K.K. (Yamatake Electric Light Co., Ltd.), Main Office, Minami Kinroku Cho, 4, Kyobashi Ku, Tokyo.

Object : (1) To supply light and power. Buy and sell electric machinery, etc. ; (2) to invest in other companies of like business.

Established : April 26, 1922. Capital. Y. 500,000, one-fourth paid up.

Officers : Representative Director : Yasukata Sonoda ; Directors : M. Nakamura and T. Kase ; Auditor : N. Akiba.

2. Kimoe Denryoku K.K. (Kimoe Electric Power Co., Ltd.)

Main Office : 620, Shiogama, Mizukawa-machi, Izawa-gun, Iwate prefecture.

Objects of Business : To supply light and power and to invest in companies of similar business. Manufacturing graphite.

Established : November 8, 1921. Capital : Y. 750,000, all paid up.

Officers : Directors : K. Ono, A. Oyobigawa, H. Yuzugi, Y. Eda, Y. Tsujiyama, S. Kobayashi, J. Goto, Y. Aoki and C. Sasaki. Auditors : K. Hanayama, J. Ogita, F. Yoshida and J. Soyeda. (All Iwate prefecture capitalists)

Change of Name : The Aikawa Denki K.K. (Aikawa Electric Co., Ltd.) of Kanagawa prefecture, changed its name to Sobu Denryoku K.K. (Sobu Electric Power Co., Ltd.), on March 16, 1922.

Furukawa Opens New Cable Factory

The Furukawa Denki Kogyo K.K. of Tokyo has recently erected a factory in Yokohama for the manufacture of marine cable. The factory consists of three mills, of which, the first is devoted to the manufacture of insulated and non-insulated electric wire and lead tubes. The second mill will produce enameled cable and wire for high-tension lines and also telephone cord. The third mill will produce paper insulated telephone and telegraph cord and paper insulated motor wire. The annual production of all three mills is estimated at a value of Y. 17,000,000. Annual capacity is Y. 30,000,000 worth of cable, cord and tube. An order has already been received from the Chinese government for 535 nautical knots of marine cable, to be used in the Chefoo-Shanghai cable. With the opening of this factory, it is believed, that an end will soon be put to Japan's imports of marine cable and high-tension wires and a balance of exports be shown within a few years.

Electric Heater Factory Planned

A new company to manufacture electric heaters, named the Nihon Dennetsu Kogyo K.K. (The Japan Electric Heat Industrial Co.), is planned by the Osaka Dento K.K., which will hold 10,000 shares, the Daido Denryoku K.K., with 5,000 shares, the Kansai Denki K.K., with 5,000 shares, the Kyoto Dento K.K., with 3,000 shares and the officers of the Osaka Dento K.K., with 5,000 shares. The total capital will be Y. 2,000,000 ; paid up, Y. 500,000. Twelve thousand of the forty thousand shares will be offered to the public. Many of the directors and shareholders of the Hanshin Dentetsu K.K. have expressed their desire to subscribe for these shares. This company will purchase the Ukita Dennetsu K.K., for Y. 125,000 and the ground used for exhibition of its electric machinery by the Osaka Dento K.K. By agreement with the Ujigawa Denki K.K., this company is also now planning to establish the Kawakita Denki K.K. (Kawakita Electric Machinery Co., Ltd.), with a capital of Y. 200,000.

HYDRO-ELECTRIC POWER SURVEY ABANDONED.—The hydro-electric power survey which has been carried on by the department of communications since 1918, will have to be abandoned during the fiscal year 1922-1923, because of lack of funds. Surveyors in the field are all recalled from the end of June, 1922.

It is hoped that the work may be continued after this year, until completed. The completion will take three or four years, at an expense of Y. 300,000 a year.

Osaka Arsenal to be Electrified

The government arsenal at Osaka is using a few electric motors, but it still possesses three dozen chimneys which belch forth smoke in the east of the city much to the distress of the people living near it. The electric motors in use have been so satisfactory

that the chief of the arsenal staff, Colonel Kurosaki, is desirous of replacing all the coal-burning furnaces with electric machinery. Power is now purchased from the Ujigawa Denki K.K. and this company would be drawn on for the increase of power required by a complete electrification. No funds are now available for the change, but it is believed that this improvement can be managed from the working funds of the institution. At least the workshop can be completely equipped with electric power, in response to a demand on the part of the workmen for more modern working conditions.

Giant Radio Company for Japan

A wireless company capitalized at Y. 200,000,000 which will greatly facilitate communications between Japan and America, will soon be established in Japan, if the plans as formulated by the Nippon Yusen Kaisha, the Osaka Shosen Kaisha, the Industrial Bank, Suzuki & Co., Takata & Co., Mitsui & Co., Okura & Co., Fujita & Co., Viscount Shibusawa and other leading financiers of Japan receive the support of the government and are brought to a completion.

The plans have been laid before Premier Kato and received his private sanction. They will later be taken up formally and from present indications will be approved.

The proposed company desires to form a company which will favorably compare with the Marconi Company of Great Britain, the Radio Corporation of America and the Telegraph Company of France. It will concern itself primarily with improving communications across the Pacific. The promoters state that as soon as the government has approved their plans, they will make a formal statement regarding the proposed action. Several expert engineers of Japan have signified their willingness to aid in establishing the company, according to recent reports.

Electric Tube for Kobe

Kobe plans to build an underground electric railway, which will traverse the city lengthwise. Tentative consent to the plans has been obtained from the city's council and an appropriation of Y. 260,000 as expenses of investigation is shortly to be asked for.

The plan informally presented at a meeting of the council on July 20 and tentatively agreed, provides that an underground electric railway be built, starting from the city's eastern boundary, paralled with the present surface steam railway, turning at the Aioi bridge to Naka-machi, through the Hyogo railway station, and under the 8 *ken* road of Nishi Shinkaichi reaching to the Sakai river on the city's boundary on the west. The entire length is to be about 4.88 miles. The proposed underground railway is to run under the future national road. The trains are to be high-speed ones.

In future, the line is to be extended to Osaka in the east and Akashi in the west.

An amount of Y. 260,000 shortly to be asked for is to be used in three years of investigation, from 1922-3 to 1924-5, so that the work of investigation may be commenced at once.

English Electric Locomotives for Japan

THE Imperial Government Railways of Japan have just placed with the English Electric Company for their Dick Keer Works at Preston an order for 34 complete electric locomotives of the total value of upwards of £500,000. This represents the whole requirement of locomotives up to the end of 1923 for those sections of their main line railways which the Japanese government have decided to electrify at once. The order was obtained in the face of keen foreign competition, particularly from America, and was placed with the English Electric Company, after the fullest investigation by Japanese engineers into the systems in operation in different parts of the world owing to their confidence in the excellence of British design and workmanship.

Eight of the locomotives now ordered are for heavy express passenger service. They are of the 2-C-C-2 type. Their weight is approximately 96 tons and they are designed to haul a 415-ton train at a balancing speed of about 60 miles per hour. Each locomotive is equipped with 6 D.K. 86A. Motors rated at 306 h.p. at 500 volts, the motors being connected in two groups of three in permanent series on a trolley voltage of 1,500 volts. The control equipment is the standard " English Electric " cam-shaft multiple unit type.

Of the remaining locomotives, nine are for local passenger service and 17 are for heavy freight service. These 26 are all of the B-B. type and will weigh approximately 56 tons each. They are equipped with 4 D.K. 86A. Motors similar to those on the express passenger locomotives, but in this case the motors will be connected in two pairs in permanent series. Here too the control is the standard " English Electric " multiple unit type. The locomotives for local passenger service are designed to haul a 315-ton train and the freight locomotive a 600-ton train, the balancing speeds being about 55 and 40 miles per hour respectively.

Japanese Dockyard to Build Electric Locos

The plan of electrifying the Tokaido railway line recently made public by the government seems to have given a sensation to all Japanese dockyard companies. Since the fatal blow was dealt on the dockyard business which was in utmost distress, by the naval limitation, they have been doing anything such as repairing and casting, manufacturing the bridges, locomotives, oil tanks, or electric cars. All of them are now reported to be pinning their hope in the materializing of the plan, in order to get the order for electric locomotives and cars. Above all, the Kawasaki Dockyard Company has already dispatched an engineer to the United States to study construction, and a part of the works is in course of reconstruction for the purpose. The estimated expenditures on the electric locomotives being only Yen 35,000,000 their obtaining enough orders to revive the depressed business is generally doubted.

Alumina from Clay

The discovery of a method of producing alumina, the original material for manufacturing aluminium, from clay has been made by Mr. Hiroshi Tanaka, attached to the department of agriculture and commerce.

During the great war, when the supply of alumina from America practically ceased, scientists in Germany made great endeavors to discover a method of production, but of no avail. Alumina has hitherto been produced from a mineral in America by means of electrification, and the majority of the world's demand has been supplied from the United States.

Aluminium is now in great request for use in various capacities, and should the aforementioned discovery be practicable, its contribution to the industrial world will be a great one.

Osaka Electric to Install New Equipment

The Osaka Electric Company was ordered by the government communication bureau in Osaka, under date of July 17, to repair completely its electric equipment, up to January 16, 1923. The government bureau after a thorough investigation conducted in the plants of the company found that among 25 other defects, the insulated copper wires were insufficient to cope with the power transmitted, and decided to issue the order. Instructions to the effect that such an order was issued were received by the public safety section of Osaka prefecture on July 23.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI, CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, AUGUST, 1922.

Kato

ADMIRAL Baron Kato has succeeded to the position and policies of Hara and Takahashi. A fighting man, he is an advocate of peace; a militarist, he is opposed to an aggressive foreign policy and the control of the government by his own group. He insists upon restoration of friendly relations with China and has placed into effect policies calculated to bring this about. Kato intends to keep the pledges he made in the name of Japan at Washington.

Kato, the man with the ideal poker face, won the hearts and esteem of the American newspapermen. He is now living up to his promises, making good his words by deeds. The American press is with him. With hardly a dissenting voice, the editors of America are acclaiming Kato as the safest and best bet for those who hope to see the resolutions of the Washington conference carried into effect. The new premier of Japan has made a great hit with America; a tremendous asset for Japan in world affairs.

Kato accepted his new task on the explicit understanding that the army budget should be reduced by Y.40,000,000 and a policy of retrenchment adopted all along the line. The garrisons at Hankow and Tsingtao and the Shantung railway guards and troops in North China have been recalled. Siberia is to be evacuated. Japan is placing into practice the resolutions arrived at in Washington, getting down to brass tacks, by retaining only such guards in China as are necessary to guarantee protection to the South Manchuria Railway.

The accusations that Japan was deliberately building auxiliary ships to neutralize the 5-3 ratio has been refuted by the official announcement that her naval building program calls for four new cruisers of 10,000 tons and five of 7,000 tons, besides 24 destroyers with an aggregate of 33,000 tons and twenty-seven submarines with an aggregate of 28,116 tons. Port Arthur is to be abandoned as a naval base and 12,000 line and non-commissioned officers are to be dropped from the Japanese naval lists. The Washington treaties have been ratified.

Admiral Baron Tomosaburo Kato, the New Premier of Japan
(The New York Times)

Militarism in Japan is becoming more and more unpopular. It is true that the military leaders are still powerful but the time is not long distant when the rising tide of liberalism will sweep them into their proper place. A change has come over the viewpoint of the young men of Japan. They avoid the army, evading military service by every subterfuge to seek their careers in the professions, in commerce and the government service. Military men as husbands are a drug on the matrimonial market. Relieved of the strain of maintaining a huge army and navy for defensive purposes, Japan is living up to the declaration of Kato at Washington. "The Japanese," he said "had never in view preparation for offensive war."

Kato has become the outspoken advocate of international understanding and of concession to world opinion. He sees no profit in any course other than a sincere endeavor to retain the confidence of the rest of the world. Japan's foreign policy laid down by Hara adhered to by Takahashi, and from which Kato will not depart, is to co-operate with the powers in the spirit as well as the letter of the covenent of the league of nations and the treaties and resolutions signed at Washington, with the view that concord and friendship may continue and develop among the nations and that reduction of armaments may steadily progress to relieve the difficulties and burdens of mankind.

Kato, the grim chief of staff of the Kamimura squadron of Togo's fleet who laid his vessels across the bows of the advancing Russian battleships at Tsushima and destroyed them ship by ship, Kato, the expert responsible for Japan's naval expansion program that placed his country among the ranking sea powers, in order to demonstrate his good faith in America gladly signed and is carrying out the provisions of a treaty which relegates his past work to the junk pile. Kato could do this, as the navy he had built was designed to defend the island empire against a possible attack by the fleets of the United States. Once satisfied that America had no aggressive designs in the Pacific, Japan had no use for a big navy and Kato could gladly accept the 5-3 ratio.

With distrust turned into confidence and understanding, the road to co-operation between Japan and America is wide open. Japan is losing no time in getting into step with the United States, the greatest insurance policy she can take out that never again will she be called upon to burden her people with the enormous

taxation required to maintain a huge navy. The Japanese of the future will be able to look back with grateful remembrance to the men who rehabilitated Japan's good name at a time when such rehabilitation was a vital national necessity.

The names of Takashi Hara and Tomasaburo Kato will live in history as the men who placed Japan in the ranks of the liberal nations of the world, when the inside story of the struggle between militarism and liberalism in that country is written other names will be added to Japan's roll of honor.

For behind the premiers, cabinet officers, statesmen and diplomats of Japan stands a party of broad-minded financiers, merchant princes and captains of industry forming part of the Japanese group in the consortium, who have laid down the program their statesmen are now adhering to. It is fortunate for Japan, for America, for China and the peace of the world, that this group has men like Kato on their side. The outburst of sincere good-will from America on receipt of the news of Kato's elevation to the premiership of Japan, is a tribute not only to the gallant admiral, but to the group who, with implicit faith in the *bona-fides* and common-sense of the American people, staked their reputations two years ago on the outcome of a campaign for co-operation that led to the Washington conference.

* * *

The Vindication of Lobinger

AMERICANS will be glad that the charges preferred against the American court for China have been dismissed after careful investigation by the department of justice and that Judge Charles S. Lobinger is back again on the bench prepared to sit in judgement on the two hundred and some odd cases which have piled up during his absence. Owing to the existence of a suit pending in the American court for China against this publication, it has been difficult for us to express any opinion on the merits of this case. Although we repose the utmost confidence in the judicial honor and integrity of Judge Lobinger, we incline to the opinion that the time has arrived when some modification of the law that will give Americans a trial by jury is essential to the dispensation of American justice in China. THE FAR EASTERN REVIEW was one of the first to urge the creation of the American court for China and recognized that the exceptional conditions prevailing in Shanghai twelve years ago, called for arbitrary powers on the part of the judge in order to clean up the undesirable element in the settlement. Conditions are now different. Many American firms with vested interests have established themselves in China. The undesirables have gone, and there is no longer any excuse for the continuation of a system that deprives Americans of their constitutional right to a trial by jury. Up to the present, Americans have been most fortunate in the judges appointed by the president to preside over the court in China. We may not always be so fortunate. It is no reflection on the judicial capacity of Judge Lobinger for Americans to plead for the institution of a system that would have relieved him of the unpleasant experiences of the past year.

The outcome of the investigations into the charges preferred against the judge is shown in the following executive order, issued by President Harding on June 23, entitled "Executive Order Dismissing the Charges Preferred by W. E. Fleming Against the Judge of the United States Court for China." It reads :

"A full investigation of the charges preferred by W. S. Fleming against the Judge of the United States court for China having been made, these charges are determined to be unfounded, and are therefore, dismissed.

"The judge of the court is hereby directed to return to his post of official duty at the earliest practicable moment.

"(Signed) WARREN G. HARDING."

This executive order was accompanied by the following personal letter from President Harding to Judge Lobingier:—

"THE WHITE HOUSE,

"June 23, 1922.

"MY DEAR JUDGE LOBINGIER,—I am enclosing herewith a copy of the executive order which disposes of the charges preferred against you as judge of the United States court for China. The record of the conclusion is filed with the department of justice. I trust you will make the earliest possible arrangements for your return to your post of duty and resume the sessions of the court. I should not be satisfied in sending you this notice if I did not say that in investigating the matter I have invited the fullest co-operation of the department of justice, and the decision is in accord with the views of that department, as I think to be becoming in view of its participation in the investigation.

"I wish for you a safe return, and a record of progress in the courts which will cure as far as possible the delay incident to the filing of charges and the inevitable delay in reaching the decision which the enclosed order conveys.

"Very truly yours,

"(Signed) WARREN G. HARDING."

The complete vindication of Judge Lobinger will stand as one of the highest testimonials to the integrity of the American bench. Americans have reason to feel a just pride in the dismissal of charges, which, if proven, would have lowered the national prestige in the eyes of other nationals in China.

* * *

Educate Chinese in China

THE campaign launched in London last year for the remission of the boxer indemnity still due to Great Britain, along lines laid down by the United States, raises the question of whether Chinese should continue to be educated abroad or trained in home colleges amidst surroundings and influences that will make them better able to cope with the problems of their own country. The argument that each student educated in Great Britain was not merely a consumer of British goods but also a rallying centre for them was used with great effect. In fact, the campaign was based solely on its beneficial effect upon British trade, a very potent argument at any time.

There was a time when such a premise had considerable force. That day is gone. Experience has demonstrated that on return to China, the graduate of foreign colleges drifts into official life where purchases of materials are governed by laws which he is powerless to modify. His preference for the materials of any one nation cuts little figure in the placing of the final order. In private life or business, the same rule holds good in another way. Squeeze or commission gives place to price and terms, and the nation that can meet the Chinese idea of what these ought to be, will get the order. The education of Chinese in American colleges has not created a preference for American materials.

The one benefit that would accrue to Great Britain from the education of perhaps two hundred students a year in British colleges, would seem to be political, counterbalancing the influence of American trained officials with their intense republican tendencies. The control of China's future development will be determined largely by whether the American educated official with his democratic leaning or the more conservative type educated in England is to come out on top.

The hope of establishing a stable constitutional government in China based on provincial autonomy with an elective president and parliament, can be attained only after years of domestic strife. The possibility of creating a constitutional monarchy, even with all the safeguards requisite for the protection of the liberties of the people will be opposed by the radical republican element. It is natural that the moral support and sympathy of Americans thould go out to those who accept their ideals, and it is just as natural that those who adhere to the constitutional monarchical theory of government should similarly encourage those Chinese who adhere to their views.

Neither of these systems have anything to commend them. Both are wrong, both difficult of application to China. The Chinese should be educated at home in his own environment. He should be taught to become a better Chinese citizen, fitted to cope with the peculiar problems of his own country and the needs of his people. A successful republic must come from below, from the education of the masses. The education of thousands of young Chinese in American colleges has simply turned loose a group of

advanced political thinkers whose ideas can only be grasped and placed in practice when the millions of China are educated to an understanding of the fundamentals of democracy. Turn loose in China another 2,000 or more graduates of British colleges and domestic politics will continue at boiling point for years to come.

The American-educated Chinese has contributed nothing towards creating a market for American goods in China. It will be the same with those who may be educated in British universities. Loan agreements and clauses in financial contracts will decide the origin of materials on all government contracts, and terms and price will control the placing of private commercial orders. If the consortium functions in the financing of Chinese railways, orders for materials will probably go to the lowest bidder. In other words, it is a mistaken idea that a foreign education will serve as a wedge for the introduction of materials manufactured by the nation educating the Chinese.

It would seem more to the point if China is to be permitted to forego the payment of the boxer indemnities in return for sending a certain number of scholars to the various universities of England, France, Japan, etc., that she should be required to put her own educational system on a sound basis, and the remitted funds employed to endow and create new schools in China. There is no good reason why the charitable people of America and Great Britain should continue to support colleges and schools in China from missionary funds while this huge indemnity is employed to send students abroad. There are already a number of educational institutions in China dependent for their sole support upon foreign missionary and endowment funds which should be more liberally supported.

Now is a good time to change the system. If the boxer indemnities are discontinued, China should give some promise that the funds so released will be utilized for educational purposes at home, and the indemnity apportioned out to worthy and needy foreign-directed colleges carrying the load of educating the Chinese youth to become better citizen, China should also be required to set aside an equal amount for preparatory schools under the direction of the ministry of education. The remission of the boxer indemnities without such guarantees, simply means so many more millions for politicians and militarists to divert to their own uses.

Are the British desirous of educating the Chinese to become purchasers of British-made machinery and tools? There is the Hongkong University, with an engineering school equal to any at home and large shipyards and industrial plants in the colony where the graduate can obtain practical experience in the use of British specialties. There is the Canton University for Americans who wish to have their ideas inculcated in the young Chinese mind. There are numerous other institutions doing a noble work preparing the Chinese for a life work of usefulness in their own country. These schools have the first claim on the beneficence of foreign governments who may desire to forego their share of the boxer indemnity. Educate Chinese in China.

* * *

The "Amende Honorable"

TWO years ago, the American secretary of commerce directed a formal letter to Admiral Benson, head of the United States shipping board, in which he accused the Japanese of tampering with, damaging and intentionally delaying American cargo consigned to the Orient in Japanese bottoms. These charges constituted a public and official denouncement of the port of Kobe and were based on the mass of reports emanating from American concerns who saw in each delay, each broken crate, each pilfered box, evidence of a set determination on the part of the Japanese government and ship-owners to ruin their trade with China.

Conditions have changed. Investigations have brought out the truth and while not entirely exonerating the Japanese from the charges of carelessness in the handling, storage and safe-keeping of cargo, the facts fully vindicate the Japanese government and steamship companies of any conspiracy or intent to willfully discriminate against or injure American cargoes entrusted to their ships for ocean transport. The new American administration has since had time to digest all the facts in the case, and compare the reports from the Far East with those from other parts of the world.

In a speech made to American business men in Yokohama, Secretary Denby referred to "the constant annoyances and impediments that ensue when our goods are carried under the flags of other nations." "Instances have been known" he added, "of the deliberate rough handling of American freight to prejudice foreign markets against it." This he characterized as "commercial treachery" and as designed to cripple the trade of a rival country. "*No such instances, I am happy to say, have I ever heard of in connection with the Japanese merchant marine.*"

There has been so much propaganda emanating in the Far East directed against Japanese shipping methods, that this official vindication was construed as an indirect indictment of the only other maritime power carrying American cargo across the Pacific. Without waiting for an explanation, British newspapers in China hastened to condemn the speech as a reflection on British shipping. The British chamber of commerce in Shanghai went so far as to direct a letter to the American chamber of commerce requesting an explanation.

As all these matters hark back to war days and at a time when American commerce was dependent upon foreign shipping, no good object can be served by reviving the stories of discrimination against American trade which deluged the department of commerce from all parts of the world. It is, or should be, a dead issue. The history of those days makes unpleasant reading for all trading nations.

The simple statement of Secretary Denby should be welcomed as a tactful withdrawal of the charges preferred against Japanese shipping and not as an accusation against other nations. Secretary Denby lived up to the purpose of his special mission to the Far East by making the *amende honorable* for the public indictment of Japan by a former American cabinet officer. There has been no propaganda in this part of the world against British shipping methods.

To assume that exoneration of Japan implies an indictment of Great Britain, and that an American cabinet officer should be called upon to explain his statement for the satisfaction of other national interests, would seem to create a precedent that can only lead to regrettable misunderstandings. American trade encountered many difficulties previous to the entrance of the United States into the war.

The average American was extremely good-natured about these interferences with their legitimate trading rights. Even after America had entered the war her trade was largely at the mercy of those nations which had the ships to spare. Americans didn't complain very much about the manner in which their shipments were handled, but took to heart the lesson that was drummed into them. They built their own merchant marine, and with it a navy of sufficient strength that would assure for the flag the respect that had been denied to it in the earlier stages of the great war. They intend to maintain that merchant marine, even if they go broke in so doing. American friendship with Great Britain stood the test. The account is closed. Secretary Denby closed the account with Japan in his speech at Yokohama. What happened to American trade during the years of the great war, will never happen again. Americans hold no grudges or hard feelings. They are under deep obligations to both British and Japanese for tuition in the rudiments of ocean transportation. The lesson works both ways. Our British friends should ponder over this and let it go at that.

Hands Across the Pacific

WHEN the Japanese delegation started on its memorable voyage to Washington it was preceded by a business men's mission composed of some of the brightest and best of Japan's liberal element. While the diplomats were making friends in Washington the business men were meeting their American colleagues in friendly intercourse and driving home their fervid hope that a better understanding would take the place of the suspicion that existed at that time. At the head of this party was Dr. Takuma Dan, one of the pillars of the Mitsui interests. How well they performed their mission and backed up their diplomats is now seen in the following letter of resolution signed by 38 noted American business men and newspaper proprietors. The heads of the *Associated* and *United Press* services, the editors and proprietors of the *New York Times, Evening Post, Herald, World, Public Ledger, Boston Herald* and *Saturday Evening Post*, and leading financiers and captains of American industry have stretched forth their hands across the Pacific to clasp those of their colleagues in Japan, an assurance of an enduring friendship that will lead to bigger and greater things.

The original of the letter was written on parchment and signed by each of the thirty-eight persons. It is a historical document marking the opening of a new era.

December 9, 1921.

Dear Dr. Dan.—We feel that we should tell you of the pleasure and privilege it has been to us to have met in friendly intercou se you and your disti nguished colleagues of the Japanese Business Men's Mission.

Your visit to the United States has been most timely and in the highest sense helpful in giving further impetus to the long-time cordiality and understanding between our two countries.

Your openness and frankness in making clear your desire for continued amity and co-operation between your people and our people, always our own cherished wish, have quite won our confidence and our hearts

We want to take with you to Japan the assurance of our steadfast friendship, and our hope so to work with you and your countrymen as to foster iudustry, commerce an lasting tranquility in all the Orient, and to promote peace in the world.

Dr. TAKUMA DAN,

Chairman, Business Men's Mission.

Signers of Testimonial

Japan Society, by Henry W. Taft, President; E. H. Gary, Chairman, U. S. Steel Corporation; Standard Oil Co. of New York, by H. C. Folger, President; General Electric Co., E. W. Rice, Jr., President; C. A. Coffin, Chairman; Westinghouse Electric & Manufacturing Co., E. W. Herr, President; J. P. Morgan; Mortimer L. Schiff, Kuhn, Loeb Co.; The American International Corporation, by F. A. Vanderlip, Chairman; Radio Corporation of America, O. D. Young, Chairman; American Locomotive Co., Andrew Flecher, President; Melville E. Stone (Associated Press); Louis Wiley *(New York Times)*; Allan Dawson *(New York Tribune)*; John Palmer Gavit *(New York Evening Post)*; Frank A. Munsey *(New York Herald)*; W. M. Hawkins *(United Press Association)*; Frank I. Gobb *(New York World)*; J. P. Morgan & Co., Thos. W. Lamont; Darwin P. Kingsley, President, Chamber of Commerce of the State of New York; Gerard Swope, President, International General Electric Co.; Edwin Morse, President, Boston Chamber of Commerce, Treasurer, Massachusetts Institute of Technology; C. F. Weed, the Frist National Bank of Boston; Cyrus E. Dallin, President, Japan Society, Boston; Robert Lincoln O'Brien *(Boston Herald)*; Alba B. Johnson, President, Philadelphia Chamber of Commerce; S. M. Vauclain, President, The Baldwin Locomotive Works; N. B. Kelly, General Secretary, Philadelphia Chamber of Commerce; J. G. Brill Company, Sam'l M. Curwen, President; Public Ledger by Richard Spillane, Business Editor; *The Saturday Evening Post*, Geo. H. Lorimer, Editor; First National Bank of Philadelphia, Wm. A. Law, President; I. Franklin McFadden, Honorary Consul of Japan, Philadelphia; Marcus Rauh, President of the Chamber of Commerce of Pittsburgh, Pa.; Aluminium Co. of America, Arthur V. Davis, President,; The Union Trust Co. of Pittsburgh, H. C. McEldowney, President; The Carnegie Steel Co., H. D. Williams; Pittsburg Plate Glass Co., W. L. Clause, Chairman.

So ends the campaign for harmony and co-operation. America and Japan have been brought into a close understanding. The pendulum has swung the other way. It may swing back, but not in our day, nor while such representative American names as the above have any influence in directing the policies of the United States. The names of the Japanese delegation headed by Dr. Dan are a guarantee that the pendulum will get stuck when it reaches its highest point and will not swing back.

* * *

Crisp and the Consortium

AT a general meeting of the British bank for foreign trade, Mr. C. Birch Crisp found occasion to condemn the new consortium along lines which proved so successful in 1912 when he succeeded in floating the first half of his £10,000,000 independent loan with the Peking government. The campaign of villification indulged in by the original promotors of the Crisp loan to influence public opinion in China against the sextuple group was one of the vilest that ever disgraced the profession of journalism. Headed by a subsidized Chinese government organ in Shanghai, and echoed by a section of the British press at home, the campaign against the consortium reeked with abuse of the British government and the British corporation that had so successfully carried the brunt of the financial battle for the advancement of British trade and prestige in China. It even went so far as to openly insult the American minister, one of the highest types of incorruptible American diplomats that our country has produced.

Mr. Birch Crisp's loan was sold to the public at 95, the bankers receiving 6 per cent. commission and the Chinese government 89. Subsequent events brought out the fact that the inside clique (in which figured the editor of the *National Review* and his Chinese partner, a high official of the Chinese government and close friend of Yuan Shih-kai) received a commission of 1½ per cent. as intermediaries. The squabble over the division of this part of the spoils was finally brought before the British courts where all the facts surrounding the deal were made public in the evidence. It was an excellent piece of business for the promotors and underwriters, but it broke China's credit, undermined the value of her outstanding bonds and compelled the foreign governments to stand by the sextuple group.

The strongest argument in support of the present consortium is the very deal which brought Mr. C. Birch Crisp into the limelight of Chinese finance. The evidence of the existence of the 1½ per cent. inside commission or squeeze to the promoting syndicate of Chinese officials and their journalistic partners convicts everyone connected with the deal of betraying the interests of the Chinese people. If the door is now opened for the present Chinese officials to negotiate independent foreign loans, the result will be a repetition of such grafting practices.

Mr. C. Birch Crisp declares that British and American financiers outside the consortium combine are most anxious to see its strangle hold on China broken. It is quite clear that they can have little knowledge of the real facts surrounding the present state of China's finances. It is perhaps true that many a fat juicy loan could be marketed at this time by financial concerns whose reputation alone would enable the bonds to be sold to a trusting public. But we repeat what we had to say in our May issue on this subject. Any firm that would take advantage of the present conditions in China to negotiate an independent loan with Peking and who would place such bonds on the market would be guilty of a crime.

* * *

中國政府鹽務稽核總所
Trimming the Salt Gabelle

JUST imagine trying to do business with the Chung-Kuo-Cheng-Fu-Yen-Wu-Chi-Ho-Tsung-So. The name itself is enough to start something. Foreigners in China abbreviated it to two words, and the Chinese followed by trimming it until there is nothing left to its original meaning but a tradition.

First, Dr. Sun Yat-sen from the presidential chair at Canton, lopped off a word or so and crippled its honorable signi-

ficance. Then General Wu Pei-fu, straddling the Kin-Han-Lung-Hai railways at Chengchow, got tired of having all these ideographs staring at him as the salt treasure rolled by on its way to Peking, and appropriated another handful. Now comes the ruler of Manchuria, his super-excellency, Field-Marshal Chang Tso-lin, who says that the title as trimmed by Sun and Wu conveys no meaning at all and he will not have the beautiful classical language of the sages murdered in that fashion in the provinces under his control. So another batch of characters have gone from the title and only the words "Chung-Kuo" remain, and even the 中 will not stand up straight.

For editing the ponderous title, Sun was acclaimed a patriot: Wu, a scholar and a gentleman, the "Hope of China." Chang Tso-lin was also acclaimed as (this being an engineering magazine, we adhere to technical terms) the name the old Scotch engineer hurls at the boob who drops a monkey-wrench into the machinery. There was also great hopes expected of Chang, and again it would not be polite to put into plain English just what these hopes led to.

For the array of ideographs at the head of this article, is the Chinese official name of the jolly old salt gabelle that provides the surplus which makes the financial wheels go round in Peking. It has been trimmed, and trimmed, and trimmed until all the surplus has been trimmed off. Even the dashes have disappeared and Chinese bondholders have coined a name of their own for it that has to be edited and expressed by a type case full of asterisks.

The associated legations mildly expressed their disapproval when Dr. Sun started to mutilate the beautiful title. They vigorously protested when Wu Pei-fu tampered further with the classics, and are now "banging the table" right violently in order to emphasize their anger at Chang's contempt for ideographs which in former days would have caused him to tremble and *kowtow*. Chang simply has no regard for the proprieties of high-sounding diplomatic official titles and his brusque deletion of superfluous characters takes the surplus out and leaves hardly enough salt in the gabelle to season outstanding bonds. There is no salt left for future coupons.

"We should worry," answer the Chinese. "The friendly powers have provided us with a fine substitute to take the place of the trimmed-to-death-salt-surplus. We will soon have the increased customs duties, and this will come under the supervision of the Tsung-Shui-Wu-Ssu-Kung-Shu." This, they admit, is difficult to trim. But one never can tell what may happen to these long Chinese names when military purists in the various provinces start to abbreviate them. On the very face of things, this title is also too long. It needs editing. In this case, the title translates into the high-sounding words of "The Inspectorate-General of the Chinese Maritime Customs."

A word to the wise should be sufficient. Experience is the best teacher and to avoid tampering with this name on the part of uniformed exponents of Chinese classics, the legations should engage a good strong arm editor and cut that title down to the "Chinese Customs," or just plain "Customs." Stop and think what trouble would have been averted had such a man been on the job when the salt gabelle was christened in Chinese. For, as sure as fate, when the increased customs revenues goes the way of the salt, wine, tobacco and other securities, another handful of ideographs will be added to the Tsung-Shui-Wu-Ssu-Kung-Shu, and unless the powers maintain a squadron in every treaty port and a brigade at all frontier posts to protect the purity of the Chinese classics, some swash-buckling, sword-rattling scholar is bound to trim the customs in the same manner as they trimmed the surplus out of the salt gabelle.

* * *

Gee! What a Wad!

It was not very long ago that Lord Northcliffe poured out the vials of his wrath upon Japanese propaganda. Now comes the Duke of Northumberland and charges Mr. Lloyd George with having corrupted the British press by conferring titles on 49 men who control important newspapers of the British empire. The descendent of a long line of belted earls probably resents the elevation to knighthood of scriveners whose pens are now mightier than the sword, but the days are past when the soldier, courtier, and sycophant can monopolize the honors of a nation. The British premier showed excellent judgement in honoring those journalists whose work during the war overshadowed the labors of many who earned titles for executive, civic or other virtues. If the Germans are correct in declaring that British propaganda destroyed their *moralé* and paved the way for the armistice, the distribution of a few titles was little enough reward for those responsible for bringing this about. In conferring knighthood upon such newspapermen as Phillip Gibbs, Percival Philipps and others, the king and premier of Great Britain honored the entire profession of journalism. It was a small recognition for strenuous and excellent work rendered the empire under the most trying and hazardous conditions, work, that in the end, undermined the efficient propaganda of the enemy and destroyed their confidence in themselves. American journalists rejoiced with their British colleagues when such men were singled out for knighthoood. Northumberland's grouch won't get much of a raise out of American editors.

We turn now to another film and we have before us on the screen the picture of a British adviser to the Chinese government lifting the curtain on the inside working of the Chinese propaganda system.

It appears that extreme hard times compelled the ministries of finance and communications and the salt administration to suspend the subsidies hitherto paid to Chinese and English newspapers published in China. According to well-informed newspapers of the Chinese capital, this economical necessity got on the nerves of a distinguished British adviser to the Chinese government, himself a well-known writer and journalist, who at once repaired to the palace and prevailed upon the president to have the payments resumed. One Peking newspaper (apparently not in on the graft) states that under the *régime* of Pan Fu as assistant minister of finance, these subsidies amounted to the sum of $125,000 per month, which, we assume must have covered all the domestic and foreign propaganda expenses of the Peking government.

A meeting of the Chinese press union was held in Peking to discuss the question of the suspension of subsidies, in which the members were informed of the activities of the British adviser in their behalf and of his declaration that such subsidies were eminently proper, being compensation for services rendered and if the government remained obstinate, he hoped the Chinese newspapermen would make a proper expression of their attitude towards the matter. The assembled journalists acting upon the advice of the gifted writer, thereupon threatened to act as strict supervisors of all acts of the government and to withhold all news concerning its activities, unless the subsidies were quickly restored.

As one newspaper in Tientsin puts it, "between this attitude and that of the blackmailer, burglar or highway robber there is no moral difference." Quite so.

A million and a half a year in press subsidies will help to explain many things. Next to being a *tuchun* or a general the best job in Peking would seem to have been the owner of an organ or the publicity agent of the powers-that-be. No wonder there was no money for other purposes. We have heard much about Japanese propaganda, but stand amazed before the supreme nerve of the Peking publicist, who with one hand in the treasury, has been hurling anethemas against all who hold opposite views. One million and five hundred thousand beautiful silver Yuans! Gee! What a Wad!

Sun Yat-sen

MALIGNED, slandered, misrepresented and hounded by a bitterly hostile press, Dr. Sun Yat-sen, the exponent of Chinese liberalism returns once more to his house in Shanghai, the victim of base treachery on the part of a swash-buckling militarist who stabbed him in the back, usurped his position and forced him to retire from Canton. The propaganda directed from Peking which has lauded Wu Pei-fu to the skies and denounced, defamed and abused the leader of Chinese democracy, has accomplished its purpose. Treason, ingratitude and disloyalty have been extolled as patriotic virtues in order to justify the betrayal of the man who stood in the path of Wu Pei-fu's ascension to the post of dictator.

It is difficult to understand what is behind the campaign to destroy the usefulness of China's foremost liberal. The defamers of Dr. Sun Yat-sen concede his honesty of purpose, his integrity and unselfishness. What higher qualities are desired in a political leader ? Is there another outstanding figure in China of whom the same can be said ? If there is one thing above all others needed in the reorganization of the Chinese government, it is HONESTY. Better an honest and untried executive, than an experienced grafter.

Is Dr. Sun an idealist ? Does he incline to socialism ? Has he a swelled head ? Does he talk big ? Well, there are, and have been in the past eight years, leaders that the western world has placed high on the pedestal of fame, of whom all these things can be said, and more. Dr. Sun is not alone as an idealist, he is not the only leader with socialistic tendencies, there are others who have communed alone with the Almighty and thought the future of the world rested in their care. Is Dr. Sun impractical ? The accusation that he is, dates back to his railway scheme which failed, not because of Dr. Sun's inexperience, but because of the meddling in China's affairs by impractical, idealistic and swell-headed foreigners. No honest financier or engineer has ever called it impractical.

What then, is the matter with Dr. Sun Yat-sen ? He is "a revolutionist," the "Mazzini of China," a "stromy petrol of politics." Admitted. But we add that any self-respecting Anglo-Saxon true to his blood and traditions would also have become a confirmed rebel against conditions such as have prevailed in China since Dr. Sun handed over the republic he founded to the arch-militarist, Yuan Shih-kai, the father of the present system of unbridled graft and oppression. For much less provocation violent revolutions have broken out in other countries.

When, in heaven's name, is rebellion justified, if not in the face of present conditions in China ? How long must a people see their constitution fluoted and trampled upon ? How long must they bear the yoke of a military despotism before rising to assert their rights ? The time must come when some leader will arise and if necessary call in foreign assistance to restore the liberties of the nation, even as the people of England invited William of Orange to save them from the despotism of James the Second, and the American colonists accepted the aid of France in order to preserve their liberties against the oppression of George the Third. Is Sun Yat-sen to be condemned because he has exercised that right to rebel which becomes the duty of all right-thinking and honest men when deprived of their liberties by despots ?

We hold to the conviction that if the constitution is to prevail in China, if a duly elected parliament is to function and the armed forces of the nation subordinated to the civil power, then this great step forward along the path of liberal government will never be taken by a dyed-in-the-wool militarist. If democracy is to triumph, if peace, happiness and justice is to prevail in this unhappy country, it will come only through the sacrifices of some idealist, some constitutionalist, revolutionist, some Mazzini, that history will call a great patriot. That honor we firmly believe is in store for Dr. Sun Yat-sen.

We know these opinions are unpopular in China, but we also believe that once the propaganda against Dr. Sun is terminated and people permitted to get a proper perspective on all that he has accomplished, that justice will be meted out to him. To our mind, despite all his shortcomings, all his errors--and they are many—he stands head and shoulders above the leaders of the Peking mandirinate whose inefficiency, corruption, self-seeking and trampling upon the rights of the people has fully justified his various attempts to restore parliamentary and popular government.

* * *

The Effect of Civil War on China's Railways

(Contributed)

CHINESE commanders cannot or will not understand that single line railways have to be run with the greatest care to avoid accidents, and it is little short of a miracle that they have so far had none as a result of their playful habit of running successive trains without staff or tablet.

Of the above statement, which appeared in local press report, it may be said that the half was not told, that the Chinese general is not so much at fault as his underlings, and that the extent of the miracle is not confined to insane infringements of traffic regulations.

The high officer in the present war has given every assistance to ensure proper working of the traffic, but generals or officials of sufficent rank cannot be stationed at every wayside station whose proper supervision is vital to proper operation of the line. Even if China were not a stronghold of nepotism and a prey to the sinecure holder, delegation of authority to men of deficient education and intelligence is inevitable at present. The bucolic relatives of the country-bred concubine and the sophisticated by heavy-eyed decadent who owes his position to "services rendered," are not calculated to make efficient railway traffic officers.

The railway machine itself suffers from the same defects. Only the foreign traffic official can flourish Chang Tso-lin's or Wu Pei-fu's visiting card in the face of the man with the Mauser pistol with any hope of success in argument. You can be armed with a proclamation signed by the Lord of All threatening death to the disobedient, and yet fail to eject three coolie soldiers from as many cars which have been converted into convenient bijou residences for a period of weeks.

In an army where mobility of responsibility is thoroughly understood and only a very local obedience is exacted, the written word is of no avail. You are only shot at dawn if the displeasure of your immediate overlord is incurred. Thus it is, that regulations are tolerated when there is no special urgency and thrown to the winds at times of stress. In retreat, or at times of urgent concentration trains are run on single lines at dangerously short intervals, entailing the suspension of all traffic in the opposing direction. Then, when the inevitable congestion occurs, some gilded one cries, Hold ! Afterwards, long afterwards as time is measured in the west, the railway undergoes a period of convalescence, during which the clotted rolling stock (the two-mile long processions of engines and cars) is broken up and reshuffled, not for the use of merchants on the brink of ruin, but to await the pleasure of the fickle-minded militarist who clings to it as he does to life or the pay of his men. This reorganization is perhaps carried out in the intervals between the local commander's naps when opium's wondrous dreams would be disturbed by the shunting of his saloon car, which, in all probability, blocks the main line. At length the railway creeps back to the anaemic life of perhaps a train each way per day, all that is possible with war's demands on rolling stock.

A railway is not generally considered a very fragile piece of mechanism. Nevertheless it demands common sense attention to avoid disaster. Thus drivers and firemen must have rest, a hot axle brooks no neglect, it is manifest unwisdom to grossly overload a car with ammunition, and still greater foolishness to marshal that car near an engine or next a fodder laden car on which cigarette-smoking soldiery loll at their ease. Yet these and many

other obvious precautions are wilfully neglected unless a foreigner observes them and insists on attention. That providence which protects the ignorant and incapable has miraculously befriended the Chinese armies. Their luck should become proverbial.

One would think the soldier incapable of doing much harm to the open cars in which he usually travels. However, he does his best, by cutting away the sides when doors are not wide enough for his needs, or by making firewood of the doors, while he elects as a rule to light his cooking fires on the top of a fuel laden car.

Occasionally the soldier revels in the superior comfort of a coupé car with upholstered seats. The trouble may start with the investigatory bayonet, or the wrench at parting with his comforts. The result is always the same; most of the car goes with him. The leather covers, the horse-hair stuffing of the seats, all brass hooks, ash trays and rack rails accompany him. He even attempts to pick the expensive plate glass windows out of their frames, and invariably smashes them in the hastiness of ineptitude or the rage of frustration. The car is left a smoke and grease begrimed shell, filthy in the extreme, verminous, redolent with the rancid oil of meals either cooked on the coupé floors on primitive charcoal stoves, or even on a chimney less brick stove erected on a linoleum floor. Who is to blame? Certainly not the soldier, who brings with him the primitive habits of the dank, dark hovel on whose never cleansed mud floor he once wallowed with the family pigs and a bundle of evil smelling rags afflicted with a Job's collection of skin diseases for which dirt alone was responsible. Naturally he pockets everything that is portable or strange with a view to its sale or conversion into something to serve his simple needs. The bull in a China shop is not more expensive or more out of place than the coolie soldier in the luxury of a modern passenger car.

The financial effect is even worse. The earnings of the Peking-Mukden Railway in 1919 amounted to some $1,600,000 (£200,000) per month. The railway has been practically paralysed for six weeks. Moreover, its earning power has been greatly reduced for an indefinite period. Something like one-quarter of its revenue is derived from the carriage of some four millions tons of coal annually from the mines district to the sea. The rolling stock is therefore principally concentrated in this area. Chang Tso-lin in his retreat, took with him into the comparatively unproductive Manchurian regions, 120 main line engines out of a total of 140 and the bulk of the rolling stock, thus leaving the mining area in a hopeless position as regards transport. Of the 10,000 or more tons which can be produced daily, the railway can now move only 2,000 tons if unhampered by troop movement. The mines are thus compelled to pile up output as long as storage space is available and then close down until-long-drawn-out negotiation secures the return of locomotives and wagons which will than need a further idle period in the shop before being fit for service.

Further, there has been the usual top-to-bottom reorganization of government by the victorious party, in which well-tried permanent officials have been supplanted by new men. This, of course, cannot fail to have its effect on the machinery of railway administration. The permanent official is an unavoidable part of efficient management. Office lore, the wisdom of experience, a knowledge of the files, and the dusty contents of pigeon-holes, are very necessary when these repositories were until recent times the haphazard holes of a mud-walled palace.

Railways protected from war damage by treaty are somewhat of an anomaly, but this is the case as regards the Peking-Mukden Railway within the province of Chihli. By the railway agreement incorporated in the protocol of 1902, China is forbidden to keep troops within certain specified areas, must confine hostilities to a zone distant at least two miles from the railway and not damage the line as to cause traffic interruption for a greater period than 48 hours. Further prolonged suspension of normal traffic is forbidden between Peking and the sea, and to ensure this, a train under the protection of the troops of the treaty powers circulates in this district.

With the exception of an ineffectual attempt to blow up a bridge these somewhat exacting conditions have been observed with care, but a tremendous amount of minor damage has occurred, while trenches have been dug right up to the tracks an infringement of treaty conditions as regards war area limitation.

The war has reduced the number of military autocrats by one which is a step in the right direction, but he would be bold who would prophesy the dawn of that era of profound peace and rigid but wisely directed economy which is absoultely necessary for China's regeneration.

* * *

The Diplomatic Status of Famine Relief

By Laurence Impey

IN the first place it is necessary to consider the origins and presumable intentions of famine relief, past and present, in relation to its uses in China. In the past it may be said with every appearance of truth that the funds raised for famine relief came from purely exterior sources and were in the minds of the donors to be devoted to direct famine relief, that is, the provision of food and clothing for the absolutely destitute.

It has gradually become apparent to those on the spot that this is a mistaken principle to apply, inculcating, as it does, the lesson of pauperism and in its place, there has been developed the theory of labor-giving relief. This is well illustrated in the famine of 1920-1921, in which I was myself employed, where the American red cross China famine relief and the international famine relief committee were both at work in the same field, one employing the theory of more or less free relief and the other giving no relief except for work of national importance carried out, on one of their construction schemes. By this time, however, the sources of the funds used, differed from those of the previous famine eras and it is necessary to consider these sources next.

The American red cross funds, as of old, came purely from outside and were thus entirely at the disposal of a foreign committee, which decided to have them handled entirely by foreigners and on a constructive basis.

The international funds, on the other hand, were partly from foreign sources, partly from foreign and Chinese subscription in China and also partly from funds allocated from a surtax on the customs and on the telegraphs. Chinese organizations, though in one case under foreign and diplomatic control. Therefore it may be argued, not unnaturally, that the Chinese should have some say in the expenditure of these funds and this was in point of fact allowed for by the election of a joint committee to the international famine relief. This, then, obviated any difficulty as far as they were concerned, during the period 1920-1921.

To consider next the position of the red cross, which had a scheme of road construction in several of the provinces, the expenditure on which amounted to something like $2,000,000 in all. This road construction was work on which the greatest number of famine sufferers or unskilled labor could be employed and it was chosen for this reason in preference to other schemes which were put forward. It was, however, necessary that a right of way for the construction of the various roads should be obtained, before work could commence, and it was obvious that the American red cross could not use foreign funds with which to purchase land in Chinese territory.

This difficulty seemed a very real one at the outset, but it was overcome by agreements made with the provincial governors on behalf of their provinces that certain Chinese funds should be allocated to this purpose and that all land required should be measured and purchased by agents and representatives of the civil governor.

I think I am right in stating that in neither of the two provinces in which I was personally working was this agreement carried into effect and I know that up to the time of the closing of the work in

the summer of 1921 this had not been done and the result was well nigh to being disastrous.

In two cases, agents of the authorities were going among the people and stating that they sympathized with them in this expropriation which they were forced to carry out, but that it was the foreigners who were the responsible parties and they themselves were powerless in the matter. If the reader will consider for a moment the state of mind of a small farmer, who was being rendered destitute by the seizure of the whole of his little plot of ground for road construction, he will be able to realize the possible state of affairs after the relief work closed down. This is stated thus in order to make the point as to the impracticability of co-operation with officialdom in such work and the dangers and difficulties which may be encountered by outside assistance.

In the famine of 1922 the American red cross took no part and the International famine relief committee dissolved and reconstituted itself as the international famine relief commission, with headquarters in Peking and branches in various provinces. The funds at their disposal were the surplus from the previous year and the customs surtax as before and the commission was again composed of a proportion of foreigners and Chinese. Direct relief and road construction have been again resorted to and on this occasion a third item, which was rejected by the red cross the previous year, has been carried into effect, namely the building of river dykes as a means of flood prevention. It is an undoubted fact that the dykes of the rivers of China are in a most deplorable condition, threatening destruction to very large areas unless immediately repaired. The old Chinese authorities who are responsible for this work seem determined to neglect it altogether, in spite of many warnings, and the result was to be seen in the devastating floods in the Yellow river, the Huai river and the Han river areas this year, which carried death and destruction for hundreds of miles. The point for our consideration comes in the expenditure of the funds. In road construction bridges may be said to be the only outlay which is not of a relief-giving character. In dyke work about fifty per cent. of the funds must be expended in the necessary materials for construction purposes. Then there is another point which might be raised.

Is it famine relief only to employ famine sufferers and only to repair dykes which have already broken and caused a famine, or can the work be applied to the repair of dangerous dykes, which will undoubtedly break in the future if not attended to and therefore cause a famine. It is a question in fact, of famine prevention *versus* famine relief and I must admit that my sympathies are strongly on the side of that old proverb which says "Prevention is better than cure."

On the other hand it must be admitted that this work is trenching on preserves which should of right appertain to a conservancy board and I think that ultimately it will be realized that in this lies the solution and the only solution, of the difficulty.

Let us then devote a few moments consideration to the possibilities of conservancy work and the difficulties in its efficient organization. In the first place it appears to be impossible to co-operate satisfactorily with the present official *régime* and it is certainly unthinkable that such work should be delegated directly to them without outside supervision and control where foreign funds were concrned.

Work of this nature must in the present state of things be provincial rather than governmental, having regard to the total lack of authority on the part of Peking, but on the other hand the only available funds come from foreign or governmental sources, which would indicate the necessity for foreign or governmental control.

It would seem, therefore, that any conservancy board at present constituted would need to have equal foreign and Chinese representation, the Chinese to be divided between nominees of Peking and the province concerned.

Secondly, the members of such board would have to be of the educated and modern type as opposed to the corrupt officialdom, in order that the board should function satisfactorily.

Thirdly, all persons employed on the work of construction must be properly qualified and not as in the past, ignorant and useless nominees of some high official.

One point which appears to me to be a little uncertain is this. If foreign funds are voted for such purposes by the famine relief commission, and foreign representatives sit on the board as their nominees, do not they to some extent approximated to representatives of other nations who are interested in such engineering propositions, as say railway construction, which has been placed more or less in the hands of the consortium for settlement and may not Chinese themselves choose to regard this assistance thus proffered as a violation of her sovereign rights ?

Part II

Accepting the suggestion of conservancy boards and road boards in theory for the purposes of discussion, it now remains to consider them from a technical attitude, and formulate the necessary work which they are best able to carry out. Road work has been pretty thoroughly explored as a famine project and the data acquired furnishes sufficient information for a working basis. The missionaries in the area concerned can supply recruiting agents who will bring in the famine sufferers and they can then be formed into gangs under their own leader.

A certain area of road construction can be alloted to a number of villages who are suffering, for it is better to keep the workmen within reach of their own homes, as on several occasions we found that riots resulted from the allocation of labor to a strange neighborhood, where the local people, perhaps themselves suffering, not unnaturally regarded it as an intrusion.

It is undoubtedly better to pay the workers in kind whenever possible, as it does away with most of the opportunity for 'squeeze,' though the handling of foodstuffs in such large quantities with the inadequate railway accommodation of China, is a matter of some difficulty.

With the exception of possible bridges there need be no contractors employed, if sufficient foreigners can be obtained to handle the workmen, either direct or with the aid of an interpreter ; and this has not proved to be the case on conservancy work in the past.

The survey work necessary for the road construction is of a much less skilled character than that needed for river work and can be carried out in much less time, while it also admits of modifications in plan during construction.

Transportation is the chief difficulty, as it concerns both the commissariat department and the engineering department alike, one with regard to the feeding of labor, and the other as to his duties of surveillance.

Leaving road construction aside as being already sufficiently dealt with, let us devote some thought to the problems that first confront us in the matter of conservancy work.

In the first place a primary survey must be made, covering the whole area of the river basin with its tributaries and extending into the mountain ranges from which the flood waters are derived.

It may not always be necessary to trace the river right to its source, though this is desirable, but nice judgement will be required to decide at what point in the course of the river it is safe to bring and how much can with safety be neglected.

To refer to a particular instance, with which I am personally acquainted, the course of the Han river would need to be topographically considered at least as far as the first important range of hills, which may be said to more or less define its course up to that point.

This would mean a survey some six hundred miles in length, by one hundred in breadth and would take about six months to prepare at a cost of say one hundred thousand dollars. Dependant on this primary survey would follow a second survey, which would prepare plans of the course of the river on a large scale, only taking into consideration the area in the immediate vicinity of both banks. Soundings would have to be taken and cross sections prepared, together with a table of water levels at various points at all times of the year, in order that the volume to be handled

could be satisfactorily estimated. These further surveys would probably cost another hundred thousand dollars, this sum total of two hundred thousand dollars, should prove to be sufficient for all requirements and with the exception of the water levels, could be put through in a little over six months. Then there comes the question as to what is the best policy to form on the data acquired and here the advice of an expert is necessary.

From what I have seen of the Han river, I will hazard a few suggestions which would probably be found applicable to other rivers in China also. In the first place the perpetuation of the present irregular course of the river is only courting destruction and a straightening of the channel in many places is absolutely necessary and will, moreover, prove a great benefit to river navigation, particularly that of Chinese junks, which are dependent on sails and oars alone and which are held up at every few miles by an adverse wind at a fresh turn in the river. Whether to cut connecting canals, or whether to use dredgers with pipe lines to straighten the bends in the channel, or whether to use a combination of both, is a matter which needs further consideration than we can at present give it.

Next there comes the question of the dyke as at present constituted, and whether it can be used in some part at least.

The Chinese have unfortunately given it almost no foundation and the water has undermined it to such an extent in many places, as to render it very difficult to repair. Piles can get no footing and rock mattresses will not lie well on such a steep and shifting slope, so that it seems possible that it will be necessary to build anew behind the old line and thus ensure good and proper construction. Owing to the fact that piling, fencing, rock building, etc., are more or less skilled occupations, it has proved impossible to employ direct famine labor on it and a system of contracting for earth-work, pile-driving, rock bunding, wiring, etc., has been entered into. This does away with payment in kind and the giving of relief where it is most needed and a wonderful system of graft enters into the proceedings at once, which, as far as I can see, cannot possibly be avoided.

Then there is the question of local contractors *versus* outside ones, a question which has given considerable trouble this year, for the local contractors are quite ignorant of the recognized methods of drawing up a contract and can see no reason why their tender should contain their lowest price for the work, in fact it never does and as soon as they discover that they have not got the contract they come round and lower their prices to what figure they think will be acceptable. Again, they have no guarantee for penalty in case of absconding, neglect or unsatisfactory workmanship.

On the other hand the outside contractor from a large city, who knows something of the work and has a guarantor, is higher in price and also is regarded as a foreigner in the locality, so that his materials are stolen and his men are boycotted and food rendered very difficult to obtain.

Timber for piling and rock for bunding have to be purchased at a distance from the site and shipped up or down as the case may be and the transport of funds is no easy matter in an area which quite possibly will be infested with bandits.

Part III

Having considered some of the diplomatic difficulties in the past and glanced at a few of the engineering problems, I would like to put before my readers an outline of the future.

In order to do this I think I cannot do better than append the agreement which was drawn up and signed by the Hupeh international famine relief committee on the one side and the civil governor of Hupeh on the other and which related to the work carried out during the spring and summer of 1922, at Sze Tze Kow.

AGREEMENT

This agreement is made between the Hankow international famine relief committee and the board of finance of the province of Hupeh, for the repair of the levee at Chow Chia Chuai in the district of Tsung Chiang. The terms of the agreement are as follows:

1. The total estimate for the work is $100,000.00 Mex.
2. This amount of $100,000.00 is to be provided jointly by the parties concerned. (The money is to be deposited in some bank.)
   The money is to be paid into the bank on the following dates as follows: February, $20,000; April, 15,000; May, 15,000.
3. The money to be used for the levee work is to be paid in the first instance into the Bank of Communications.
4. The above appropriation for this work is to be under the joint control of both parties.
5. All payment vouchers are to be signed by both parties, otherwise they shall be void.
6. All the engineering works are to be under the joint control of both parties, each party appointing an engineer.
   The engineers are to consult as to the plan and progress of the work, in order that it may be carried out in the best possible manner.
   All the field force are to be hired upon joint consultation.
7. After signing the agreement both parties are to decide a definite date upon which to start work.
8. This agreement is made out in duplicate, each party keeping one copy.

Signed and Dated,
the 11th year of the Republic of China, March 20th.

This agreement sounds very nice on paper the first time that one reads it over, but on further consideration there are various points that present themselves for further reflection.

The first three paragraphs pass without discussion, but the whole difficulty is raised by the fourth and following ones.

The funds can conceivably be under the joint control mentioned, but in that case what happens if there is a dispute?

The vouchers can be signed by both parties, but what if one party declines to sign any particular voucher?

And above all how can you have two chief engineers on a job working in a sort of partnership?

Again, in practice it is difficult to hire your field force jointly.

What actually occurred in this case was this:

The committee placed all the funds in the hands of a firm of accountants who placed cashiers in the field.

The committee appointed an engineer who took charge in the field.

The engineer appointed all the staff through the committee and placed all contracts.

The government appointed a representative who was not an engineer and who knew nothing about engineering or accounting, but who fulfilled the functions of both on their behalf.

He recommended his brother as a foreman when he was already a contractor and finding the contracts were already tendered for he retired gracefully into the background, whence he emerged occasionally to nod his head sagely at the work and sign vouchers which had already been paid.

This scheme works perfectly well, but it hardly seems fair to the other side, if they had perchance any real desire to make themselves a force for good, instead of a nonentity.

Considering matters from this view point it becomes evident that:

1st. Funds must come from joint contribution.
2nd. The government very justly may expect to be represented.
3rd. In previous conservancy boards a foreign engineer has been found to be a *sine qua non*.
4th. The funds must be under foreign supervision, in a foreign bank.
5th. The board must be at least equal representation of foreigners and Chinese.
6th. A reliable firm of accountants must be employed.
7th. It is vital that every facility be given by the local authorities to the engineering parties on the work.

8th. No unnecessary posts or appointments must be created.

9th. The old corrupt system of dyke officials must be done away with.

These matters having been presented for the consideration of the reader, we will now turn to a short outline of what has been done, or is proposed to be done, for the future in the matter of the formation of a conservancy board, in the Han river area or the Hwai river basin, both of which have been worked on by representatives of the famine relief commission, during the past six months.

With regard to the Hwai river scheme, the Shanghai committee have definitely decided to provide a fund of $150,000.00 to enable the board to function and to appeal to the authorities and famine committees of Kiangsu, Anhwei and Honan, to allocate similar amounts to the purpose.

It has been recommended that some engineer of high reputation be secured to advise on the scheme and Dr. J. R. Freeman has already been approached.

Data is being secured from Chinese records to allow such engineer to form some preliminary opinion as to the nature of the work and the high water measurements of the flood of 1921, are already being registered to this end.

The proposed formation of the conservancy board includes the following :—

Military and civil governors of Kiangsu, Anhwei and Honan.

American, British and French Consul Generals, Shanghai.

American, British and French Consuls, Nanking.

Provincial assemblies of Kiangsu, Anhwei and Honan, one representative each. The executive committee to be composed of five foreign and five Chinese members and two co-operating treasurers be appointed.

The formation of the conservancy board as outlined above has been undertaken in response to numerous appeals from Chinese and missionary sources and the committee has placed it upon record that :

" Our sole interest is to prevent future famines and neither this committee nor the Hwai river conservancy board, nor any member thereof shall directly or indirectly have any interest in the reclamation of land, or in any land speculation, or any claim on reclaimed land, or any interest whatever in schemes pertaining to profit from this Hwai river work."

This seems to cover the situation very fairly and the only point of general interest that is not dealt with, is the question of obtaining funds in the future by taxation or grant, to enable the work to be carried forward, as the possible grants of $600,000.00 already mentioned, will only start the ball rolling.

To turn to the question of the proposed Han river conservancy board, the arrangements there are not so far advanced in some ways.

The proposal of the famine relief committee is roughly this :

To raise a sum of $300,000.00 to be matched by an equal sum from the Hupeh government, making $600,000.00 in all.

To take $100,000.00 for the expenses of an immediate survey of the area affected and to invest the remaining $500,000.00 at say 8 per cent. interest, the sum obtained to be devoted to the costs of overhead expenses and the staff salaries.

The Hupeh government are to be asked to raise $500,000.00 annually by taxation for expenditure and the governor on being approached, is said to view the matter favorably and to promise his support.

A joint committee is to control expenditure, but no arrangements as to an engineering staff have yet been made.

The American red cross is being approached with a view to the advancing of certain funds and in this case it is proposed to allot one-half the representation to the Hupeh nominees and one-quarter each to the red cross and the international famine relief committee. Either party may withdraw from the scheme with their share of the fund's on one year's notice thereof and these features complete arrangements as far as they have gone.

One point is worth noticing : in the 3rd year of the republic there was a Hupeh conservancy board in existance, with allotted funds of some two million dollars or under.

The question is what became of those funds, are they still in the possession of some bureau, or is the board no longer in existance ?

An awkward situation might conceivably arise, if the old board appeared after work had started and asked for a share in the proceedings.

If these difficulties in the way of both the boards can be overcome, the persons in charge of the negotiations can satisfy themselves that they have made a very noticeable advance towards the development of China, and put through one of the best schemes of relief that has been projected here or in any other country.

* * *

Opportunity for Mining Engineers in China

By H. Foster Bain

Director, Bureau of Mines, Department of the Interior, Washington, D.C.

THE opportunity for mining engineers in China is limited despite the widespread presence of mineral deposits. The current notion that China is a country of unlimited mineral wealth is hardly in accord with the facts. Many deposits occur and there is a wide variety of minerals present, but in a majority of instances the ore bodies are small and of such type as not to lend themselves well to modern methods of mining. Many of them can be mined better and cheaper by Chinese methods or some simple modification of such methods, than by those used in America. So far as number of opportunities is concerned, therefore, the future lies with Chinese rather than foreign engineers, which is probably as it should be.

The young Chinese, now studying engineering in America and Europe, will have abundant field for work, provided they recognize the needs of the situation, are content with the scale of operations that the character of the deposits require, and are content to build on old foundations. A limited number of engineers, foreign or Chinese, will find a field in exploitation on a large scale and by modern technical and business methods of a few metal-bearing deposits and in mining coal. Then a large and satisfactory field may be expected to develop as the country becomes industrialized. Indeed, coal is the one mineral of which the quantity present is at least as great as has been represented. Extensive fields are present both in the North and the South and coal of wide variety as to quality is present. The mining conditions are by no means easy, resembling those of Europe and our anthracite fields rather than those obtaining in most American bituminous fields.

An excellent start in the introduction of modern technology has been made especially by and under the guidance of a brilliant group of Belgian engineers. The present trouble with the coal business in China is that the market is limited and except for a few centres of consumption the demand is scattered over a wide territory. Such coal as is sold goes out in small quantities and, with inadequate and expensive transportation, the final cost is high. The per capita annual consumption of coal in China is approximately one twenty-fifth of one per cent. in contrast with five and one-half tons in the United States. The difference from a business point of view is obvious. It is to be expected that coal mining will increase in China and a moderate sized iron and steel industry is already fore-shadowed.

The resources of iron ore, so far as now known, are not of the order of magnitude that will support a large industry. In the far western provinces, the geology is such as to lead to reasonable expectations of finding really large bodies of gold, silver, copper and lead ores and there are other indications supporting this anticipation. In Manchuria and Mongolia, there are gold placers that may well prove of first order of importance, but the disturbed political conditions and the number of bandits, added to the inherent difficulties of climate and distance, have so far precluded even adequate exploration.

In Hunan, there is probably the world's greatest supply of antimony ores. A dominant position has been acquired by a Chinese company which is managed by a very capable Chinese engineer resident in New York. It is entirely possible that in the antimony market the Chinese will come to occupy the same relative position as international nickel does in its field or the American producers do in supplying the world's need for copper.

In general, China produces a wide variety of minerals, but, up to now, does not even supply the domestic market. Further development is called for, but, because of the small size of the individual mines and the fact that such ore bodies can be worked better by hand than machines, the exploitation of the mineral wealth of the country is likely to rest mainly with Chinese engineers. —*Engineers and Engineering.*

Tsingtao International Club; Opening Day, June 1st, 1922

INTERNATIONAL GOOD-FELLOWSHIP AT TSINGTAO

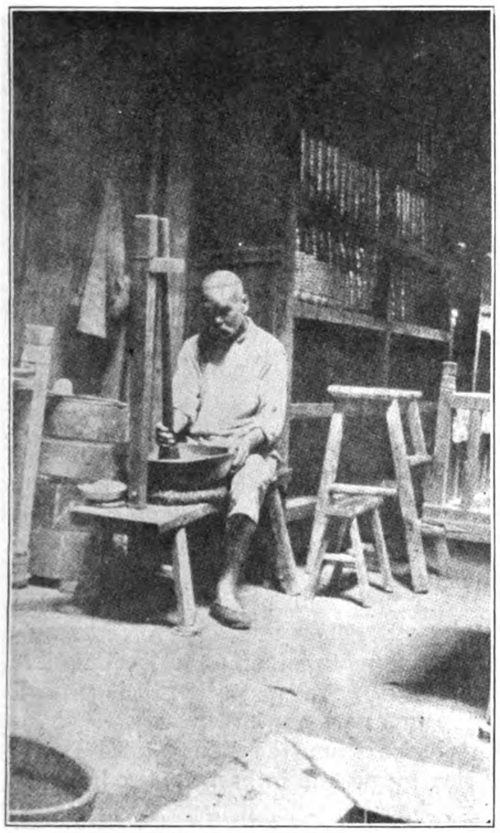
TSINGTAO has set an example of international goodwill and fellowship deserving of emulation in other parts of China, where various nationalities, like birds of a feather, flock together and Chinese and Japanese "go by themselves." Shanghai has its Union Club organized to bring all nationalities together, and in a way, serves as link of understanding with the Chinese, but for all practical purposes it may be called a "senior" or taipan affair, lacking the popularity which the club deserves.

It comes as an agreeable surprise to learn that Tsingtao has taken the lead in the establishment of an international club for friendly and social intercourse that has brought together Europeans, Americans, Japanese and Chinese. The local residents are justly proud of their experiment, with every member pulling together to make the club a real link of understanding. Seated in the centre of the above group is General Yue, Japanese military governor, of the territory now being turned over to China. The presence of other prominent Japanese officials, merchants and bankers with Chinese and foreigners seems convincing proof that whatever opinions may have prevailed against Japan three years ago, ill-feeling has been superseded by a more cordial spirit of good-fellowship.

Chinese Kaolin for American Potteries

AMERICAN potters are looking around for a source of raw material that will permit a lowering of the high prices now prevailing for the finished product in the United States. Most of the *kaolin* imported into the United States comes from England and none from China. The cost of this clay has risen in England, according to quality and degree of preparation for the market by 139 to 225 per cent., in 1920 over pre-war costs which increase is reflected in higher prices to the American potter, and in the retail prices to the consumer.

While clay in its ordinary form is widely distributed throughout the world, the purest form—*kaolin*—is restricted in its occurrence in large quantities. In the United States the relatively few deposits of known commercial value are for the most part in the southern states, although California, Colorado, Nevada and Vermont, have important deposits and are producers of *kaolin*. It is probable that a thorough investigation would disclose large reserve *kaolin* resources in the United States. Even so, the question would arise as to the commercial value under normal conditions, that is, ability to compete in the domestic market with imported *kaolin*, for even the stimulus of the demand during the war, when American potters had difficulty in supplying their needs from foreign sources, did not result in a marked increase in the output of clay in the United States.



Mixing the Color

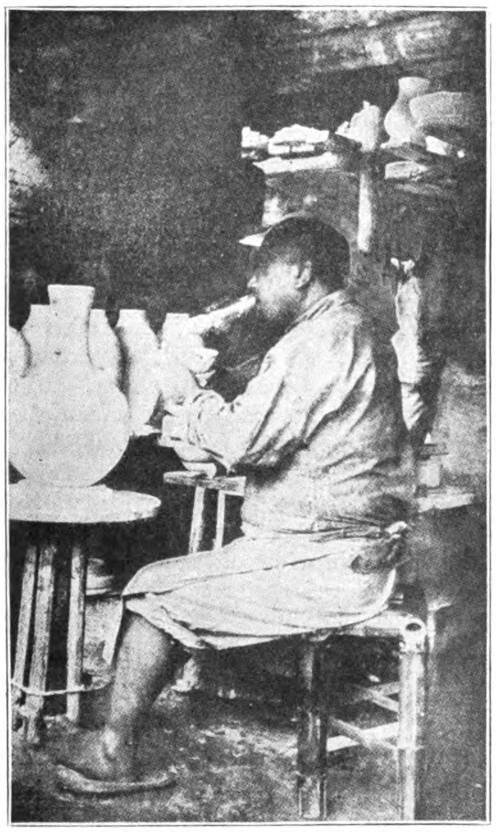
Pouring the Glaze

An Old Craftsman *(from "Asia")*

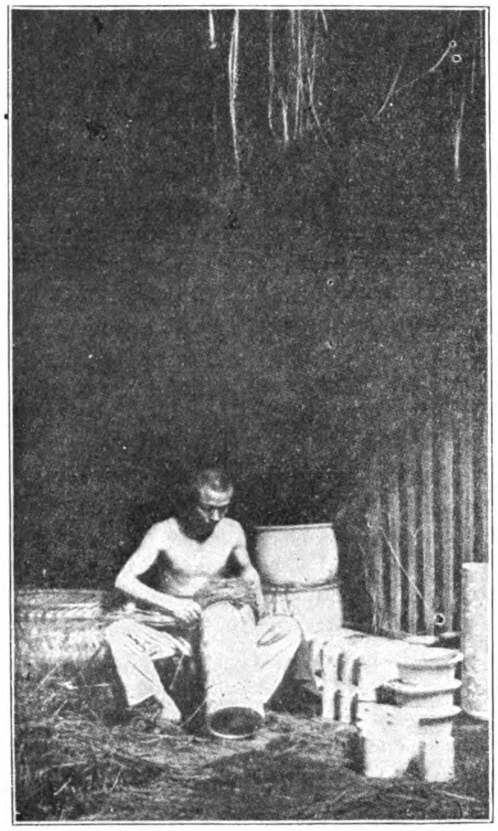
The fact that shipping and trade conditions and demand for special qualities of material may continue to cause the United States to bring *kaolin* from abroad, even though an ample domestic supply is available, should be borne in mind. Foreign *kaolin* was recognized as so vital to the domestic pottery industry that no order curtailing its importation was issued by the government during the war. However, during the summer of 1918 the British shipping authorities ruled that no clay could be exported from England to the ports of Boston, New York and Philadelphia in order to prevent congestion at these ports and leave shipping space available for other cargoes. This ruling was reflected in a marked diminution of imports from England.

This situation is turning the attention of American potters to other sources of supply and the department of agriculture recently sent out a special trade commissioner to make investigations. This gentleman, Mr. J. Morgan Clements, calls attention to the possibility of obtaining supplies of high-grade *kaolin* from China, and he believes that a detailed study of the *kaolin* deposits of China will result in the finding of deposits more favorably located to supply the markets of to-day than those now utilized in the ancient centres. In the interior of the province of Fukien, especially, there are several undeveloped *kaolin* deposits that appear promising in size and quality, and doubtless a search would disclose others more favorably located with respect to transportation than these.

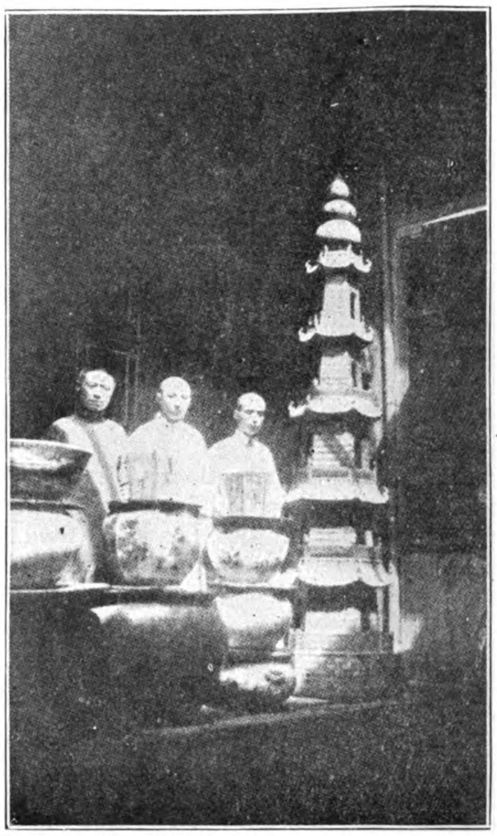
"The Chinese, so far as we know, first made porcelain during the Han dynasty, from B.C. 210 to A.D. 220. In A.D. 1004 the the Emperor King Teh established the imperial potteries at a place in the province of Kiangsi, south of the city of Kiukiang, on the Yangtze River, which received the name of King Teh Chen, and has ever since remained the chief centre of the ceramic industry of China. In the earlier centuries only white and colored porcelains were made, then about A.D. 1268 decorative painting of porcelain was introduced . In recent years potters of this district have begun to produce foreign styles of porcelains. There are reported to be somewhere around 150,000 potters employed. The clay from which the porcelain is made is, according to von Righthoven, a high-grade sedimentary clay.



Blowing the Glaze On



Packing for Shipment

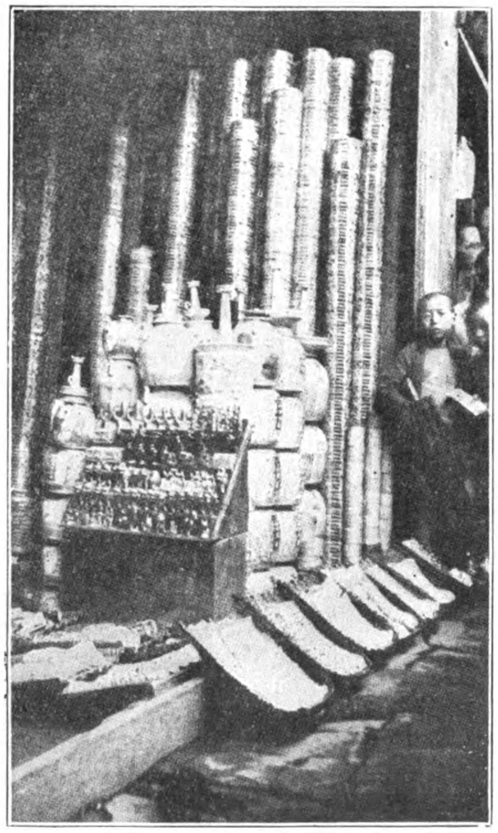


In a Kingtehchen Factory *(from "Asia")*

"The next porcelain centre of renown is Te Hua, in the interior of the province of Fukien, 50 miles due west of the coast city of Hing Wah. This centre has specialized largely in white porcelain statuettes, with other articles in white or with blue patterns, but has gone more recently into the production of foreign-style porcelain painted in various colors. Te Hua uses a high grade of *kaolin* which occurs in great quantity in the immediate vicinity.

"The third pottery centre is Shekwan, near Canton, in the province of Kwangtung. This is a comparatively new centre, the industry having been established there about 700 years ago. The highest grades of porcelain are not made in Shekwan proper, but are produced in Kochow, a small town in the same district. High-grade clays obtained in this locality are chiefly used, but it is stated that some *kaolin* is brought in. For a long time foreign shapes have been made here for the export market."

The best grades of porcelains are manufactured at the above three places, but ordinary pottery is made practically all over China, and in traveling in the interior one frequently passes through local pottery centres where earthenware bowls, teapots, vases, cuspidors, etc., are produced. All of the most important plants in which the highest-grade wares are made and which use the best grades of clay and *kaolin* are situated in southern China in the great area south of the Yangtze river. In many respects this area is comparable with the area embraced in the southern states of the United States, especially as regards temperature and rainfall—the important factors which influence the alteration of the rocks from which *kaolin* is produced. South China is more favored than the southern part of the United States in the wide distribution of the types of original rocks from which *kaolin* is derived and in the occurrence of large deposits of the clay.

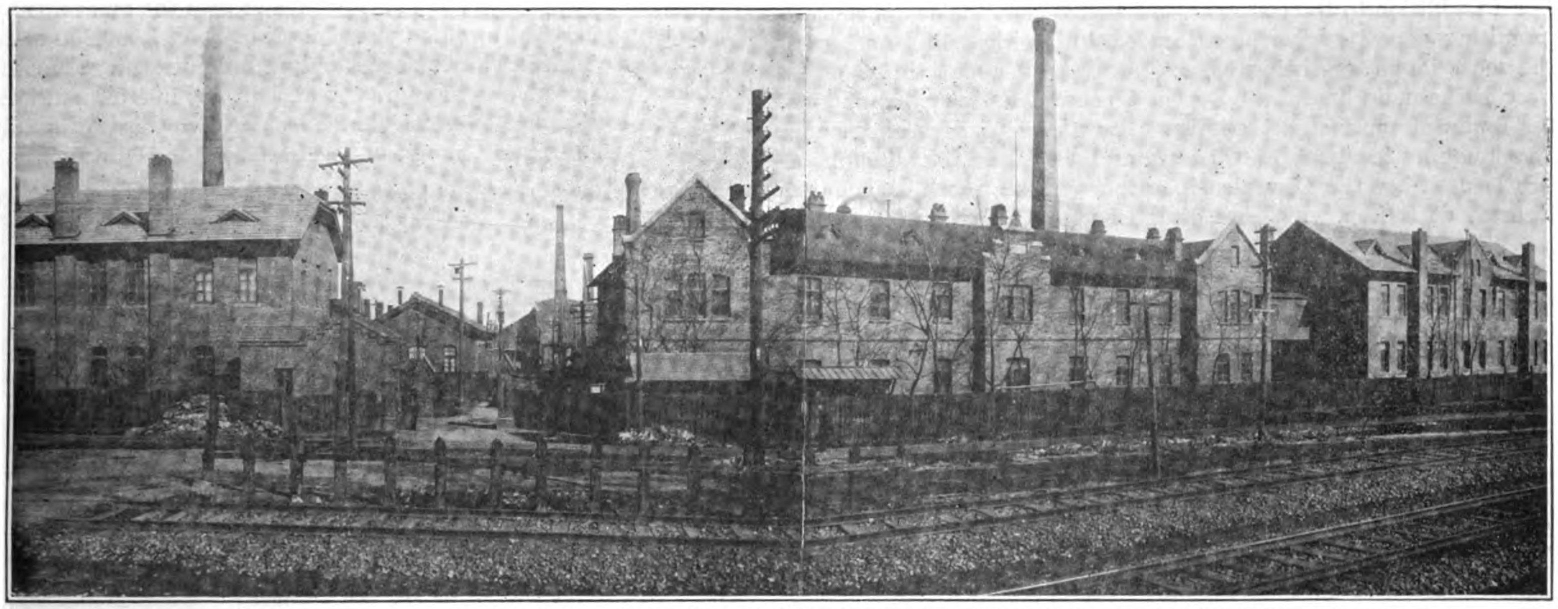


A Shop in "Porcelain Street"

The high-grade porcelains are made from *kaolin* obtained within short distances of the pottery centres, but none of these *kaolin* deposits are conveniently situated for export. Transportation has not been in the past an important factor in the minds of the Chinese; the Chinese industries, especially the pottery industry, are the result of the gradual growth of centuries, starting with the object of supplying purely local needs. No consideration was paid in the first instance to factors other than the known occurrence of the raw material and the local market, the factor of transportation being negligible under these circumstances. Thus the output from the kilns at Te Hua is carried by porters in baskets, two balanced on a shoulder pole, distances ranging up to 100 miles to market.

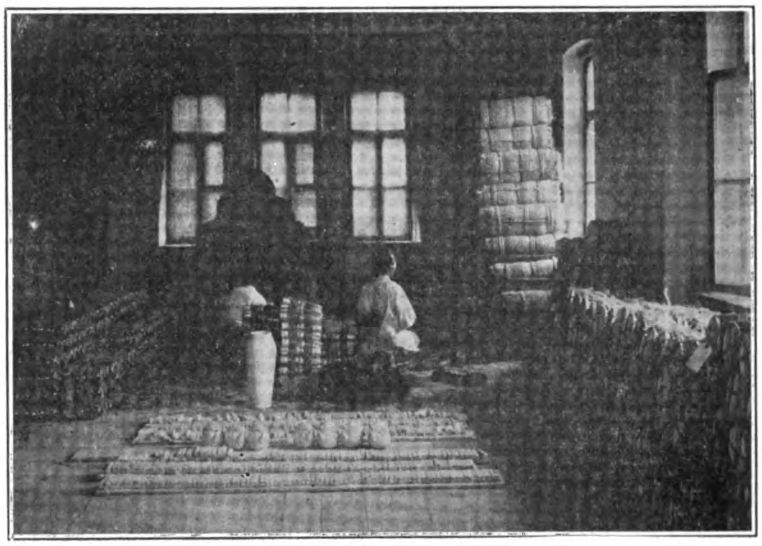
In modern practice, the economic assemblage of raw materials for the product to be made and the case of reaching the best markets are thoroughly considered before the location of the manufacturing plant is decided upon.

The most favorably located Chinese deposit of *kaolin* so far reported and which could serve as a source of supply for the foreign market, is in the province of Kwangtung, and as there is no pottery industry in this vicinity, the exploitation of the field should meet with hearty local co-operation, since it would offer continuous employment for a number of people otherwise dependent entirely upon the intermittent local agricultural demand for labor.



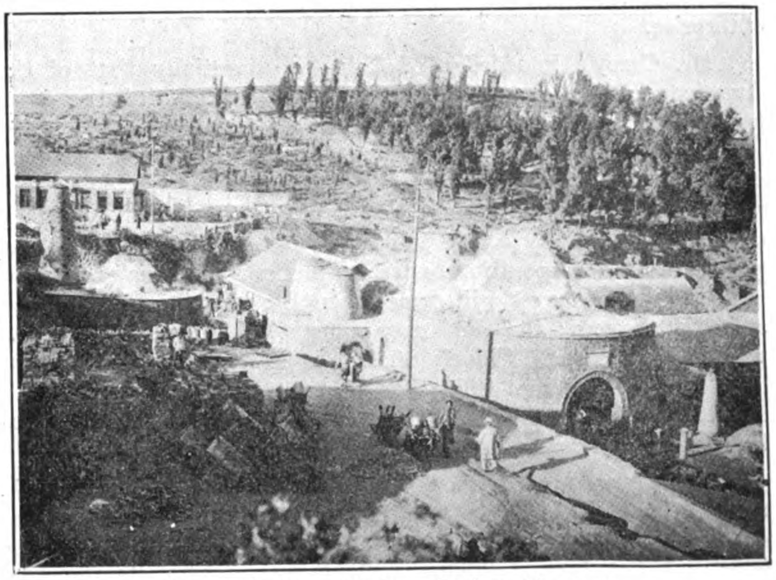
Ceramic Works at Dairen erected by the South Manchuria Railway Company and turned over to the Tahua Pottery Company.

Decorating Bowls



Packing for Shipment

Chinese Potter at Work, Poshan

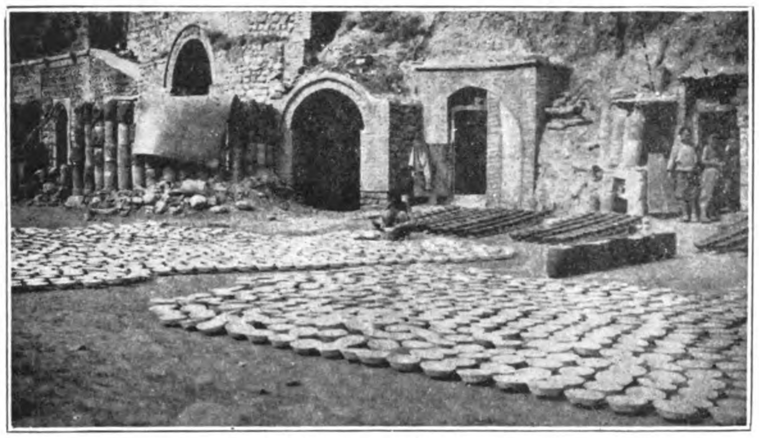


Chinese Pottery Works at Poshan, Shantung

Manchurian Deposits

In addition to the centres mentioned by Mr. Clements, several promising deposits have been located and worked in Manchuria, the most important being located at Fuchou about thirty miles west of the main line of the South Manchuria Railway just outside the limits of the leased territory. The annual export of Fuchou clay amounts to about 70,000 tons, and a considerable amount of this is used by the Ceramic laboratory of the South Manchuria Railway at Dairen, which has established a high reputation for its products and is now exporting china wares to Japan and elesewhere. A plan has been proposed to connect Fuchou with the main line by a narrow gauge railway, which would cost about Y. 1,000,000 or to connect the quarries with the coast only a mile distant. Another promising field producing high-grade porcelain clay in fair quantities and which is now being investigated is located two-thirds of a mile north of Tumenling station on the Kirin-Changchun Railway.

Another large centre is located at Poshan in Shantung where potteries have been at work for centuries.



Making Rice Bowls

Chinese Pottery Works

America's Best Opportunity

"IT is in China, not in Europe, or a possibly reorganized Russia that the greatest chances for American business lie. But at this moment conditions are distressing." Such is the opinion of a growing group of experienced Americans of whom the speaker quoted is among the most distinguished and the best informed.

W. F. Carey, famous in the Far East as a railway and canal builder, is an American pioneer of trade, and, more particularly, is an unobtrusive but widely recognized expert with regard to Chinese affairs.

Greatly to his surprise, Mr. Carey was recently elected president of the world-famous American organization known as the China society, the organization *par excellence* which links the great struggling republic, Americans, business and professional, who see the need of trade and friendship in the Far East generally, but especially in China, holding that there lie especially promising opportunities for the investment of American thought, money and enterprise.

Mr. Carey's knowledge of China is essentially that of the American of the constructive mind. He has studied the great land and people from the practical viewpoint.

' The very simple and impressive reason that to-day China offers the best opportunities for America and Americans to be found anywhere in the world," Mr. Carey went on, makes the presidency of the China society a big job for a man who realizes what the possibilities of co-operation between America and China are.

" The time never will come when Europe can offer us such splendid chances ; the time may come when Russia may, but it will not come soon. China's offering is now.

" Everything that China has is open to Americans, including those basic things which will give access to all others—transportations and communications.

" The people are there, the soil is there ; and it is fertile soil ; nothing is needed but the building of railways and for these the opportunities are so great that many thousands of miles might be constructed without running the slightest risk of building lines for which there would not be sufficient business.

If Americans do not build China's railways, making the vast profits they will yield, Europeans will.

W. F. CAREY

Famous as one of America's Foremost Railway Builders, and as head of the Siems-Carey Railway and Canal Company, holding contracts for the Construction of 1,100 miles of Chinese Railways and the Improvement of the Grand Canal, has been elected president of the distinguished American organization known as the China Society.

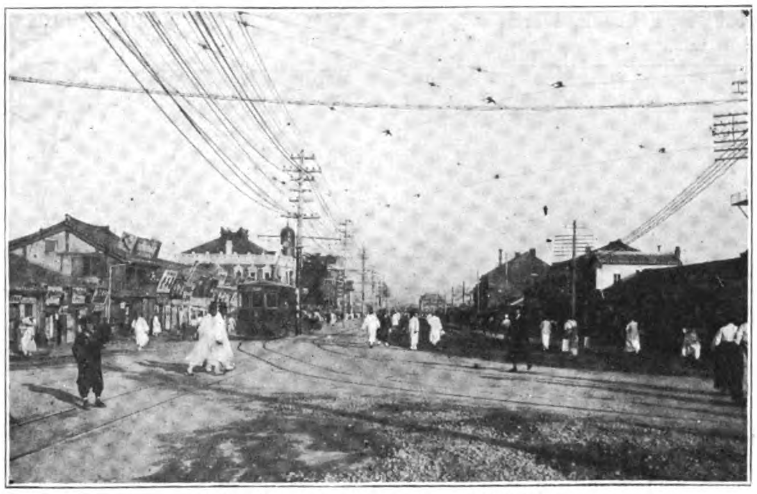
Engineering Notes from Korea

Electrical and Railway Developments

ABOUT forty towns in Korea are now equipped with electric light and power plants. With the growth of industry the number of applications for licenses to erect power houses has increased. Since the beginning of this year the following licenses have been granted :—

Name of company.	Purpose.	Promoter.	Capital.
Anshu Denki K.K. ..	Light	Utaka Yoshida	Y. 50,000
Keishu Denki K.K...	Light & Power	Saiichi Murakami	120,000
Yuki Denki K.K. ..	,, ,, ,,	Cho Otomo	200,000
Joshin Denki K.K. ..	,, ,, ,,	Sanei Kitagawa	100,000
Shari-in Denki K.K. .	,, ,, ,,	Taiko Denki	—

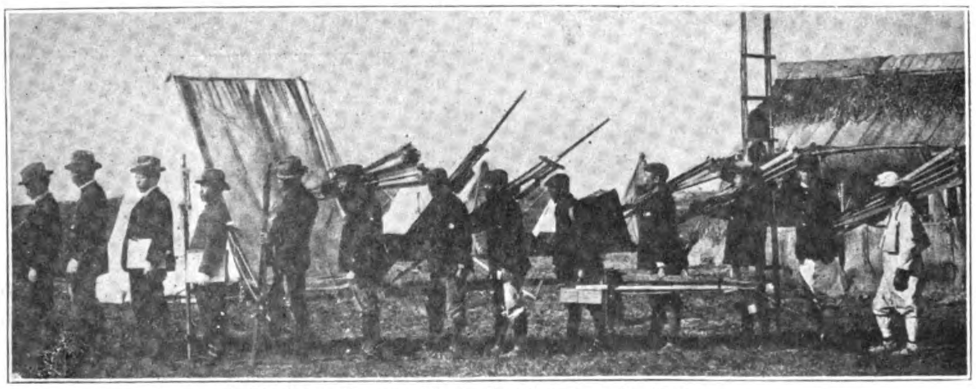
Besides these companies, it is known that the Keishun electric railway and the Kongosan electric railway will both shortly be opened to business. The electric bureau of the communications department of the Korean government will undertake to obtain loans at low interest for new electric enterprises in need of funds.



The Electric Tramway of Seoul

Railway Development

The survey of the new government railway line between Taicho and Shimpo has been completed and the bureau of communications will shortly invite public tenders for its construction. The total track between Taicho and Shimpo will be 32 miles. Between Kanko and Taicho, the Kankyo line, is now completed to a distance of 23 miles. When the line is completed 55 miles of track will be in operation.



A Railway Survey Party Starting out in Korea

Electrification of line postponed.

Keijo - Jinsen line not to be changed.

Much agitation has been going on about the electrification of the government railway line between Keijo and Jinsen. But the government is unable to see the advantage of the change as the number of passengers now carried is not sufficient to justify the expense of electrification.

However, the bureau of communications in the near future, will operate automotive railway cars on this line. The expense of these cars will be only Y.300,000, as electrification will cost Y.1,800,-000. The design of the cars has been adopted, and the Keikan workshop of the Chosen railways will construct the carriage bodies, while the machine parts will be made in Japan. These cars will be in operation this autumn.

The survey of the line of the Minami Chosen Tetsudo K.K., in the eastern, districts is making rapid progress. It is reported that the section through the Ryutan pass will be the most difficult to construct. Purchase of the right of way will be begun shortly, and construction in some parts will be inaugurated this month.

The Keinan Tetsudo K.K. has completed the first part of its program of construction. Stations on the line are almost completed and the erection of locomotives and carriages is finished.

The railway planned to run between Shingishu and Tashijima, called the Okorinko Railway, will be constructed by private capital. An investigation has been completed into the practicability of the line, and the application for a license will be made shortly. Estimating cost of construction Y. 100,000 a mile, the total cost for the 21 miles planned will be Y. 2,100,000. The company will, therefore, have to be capitalized at Y. 5,000,000 to Y. 7,000,000. If only one-fourth is paid up, as is usual, the authorized capital will probably be Y. 10,000,000 to Y. 15,000,000. As soon as the license to construct is granted, the capital will be forthcoming, as all arrangements with the people of the districts traversed have been made, and the line is very welcome.

There are eight private railway companies in Chosen today, which receive 8 per cent. subsidy on their paid-up capital from the government. However, only four of these companies have started operating and one of them even has done nothing at all since the license was granted. The total cost of constructing these eight lines will total Y. 70,000,000. The government will not increase its present subsidy of Y.2,500,000 a year, no matter what pressure is placed upon it and under these circumstances railway officials declare that it will be impossible to operate. Consequently, these four companies have not been pushing construction.

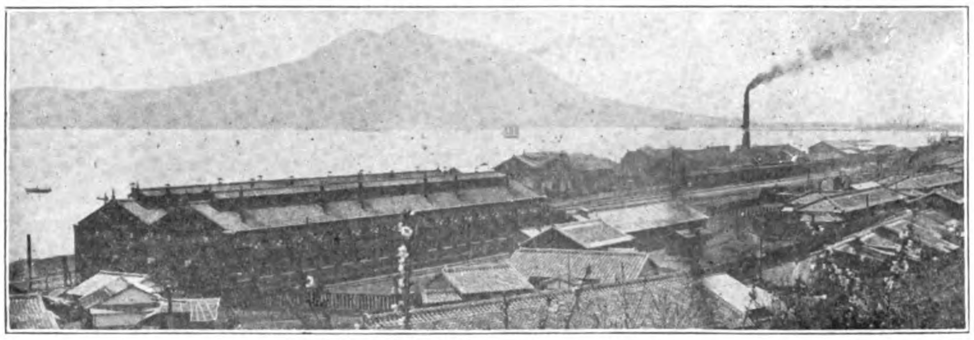
The Keinan Railway and the other seven companies have applied to the government for an increase of subsidy to 10 per cent. a year on the paid-up capital and also to extend the term of subsidy from ten to fifteen years.

Korean Railway Association

At the Chosen hotel in Keijo, on May 10, the first meeting of the Chosen railway association was held. The rules of the association were approved and the following officials elected : President : Yozo Kubo ; Advisors : Yasukichi Nishimur, Koraro Yuge, Shunkichi Minobe and Mitsutoyo Ariga ; Honorary Members : Rentaro Mizuno, Isaburo Yamagata, Ryutaro Nomura, Koi Furuichi, Gonpei Oya, Eiichi Shibusawa, Senkichiro Hayakawa, Eizo Ishizukz and R. Kanyo.

LOCOMOTIVES ON KOREAN RAILWAYS.—The Chosen railways (government) are operating 288 locomotives. Of this number 102 are used for passenger trains only, of which twelve are of the most

S.M.R. Workshops, Ryuzan, Korea

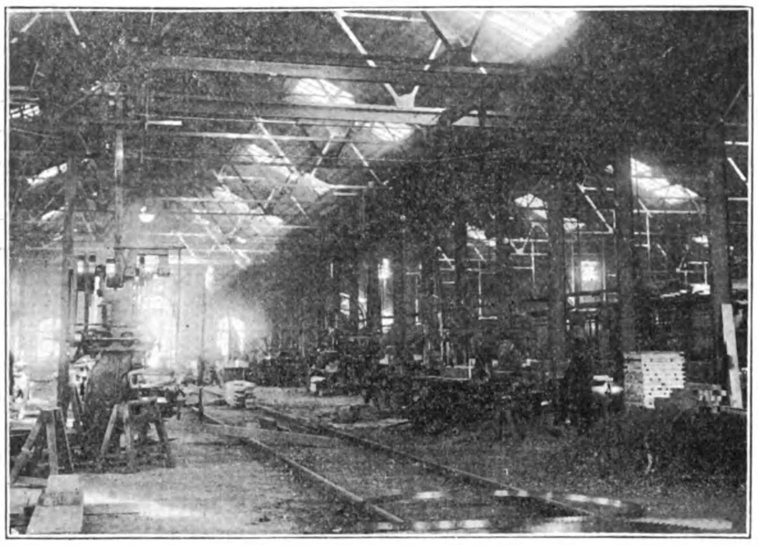


S.M.R. Workshops, Fusan, Korea

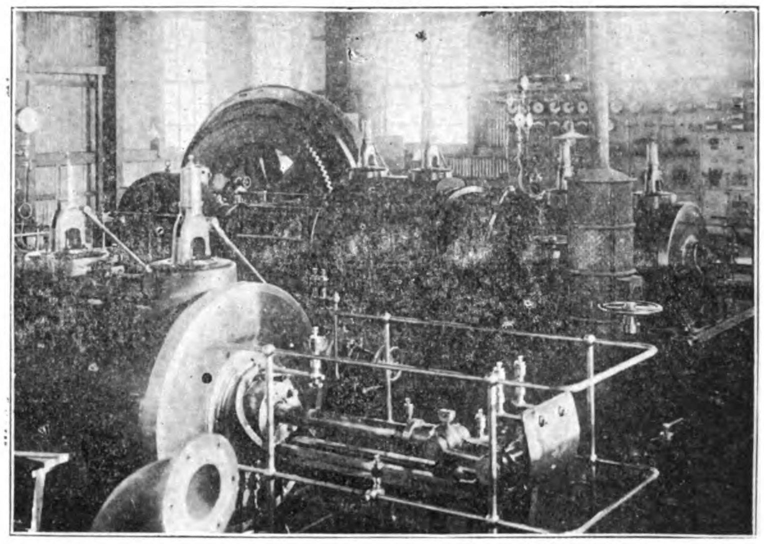
powerful "Pacific" type. Because of the inconvenience of using more than one locomotive on trains on the main line the railway bureau will purchase twelve more "Pacific" type locomotives during the present fiscal year, 1922-1923.

Korean Manufacturing Statistics, 1920.—The Chosen government general has just published the figures for industrial production in 1920. The total number of articles manufactured (including raw silk) was 190, valued at Y. 234,-145,587. Articles produced by Japanese were worth Y. 70,865,295, or 36 per cent. of the total. Production by foreigners amounted to Y. 898,130, or 4 per cent., and the balance of Y. 159,693,162, or 70 per cent., was entirely produced by Koreans.

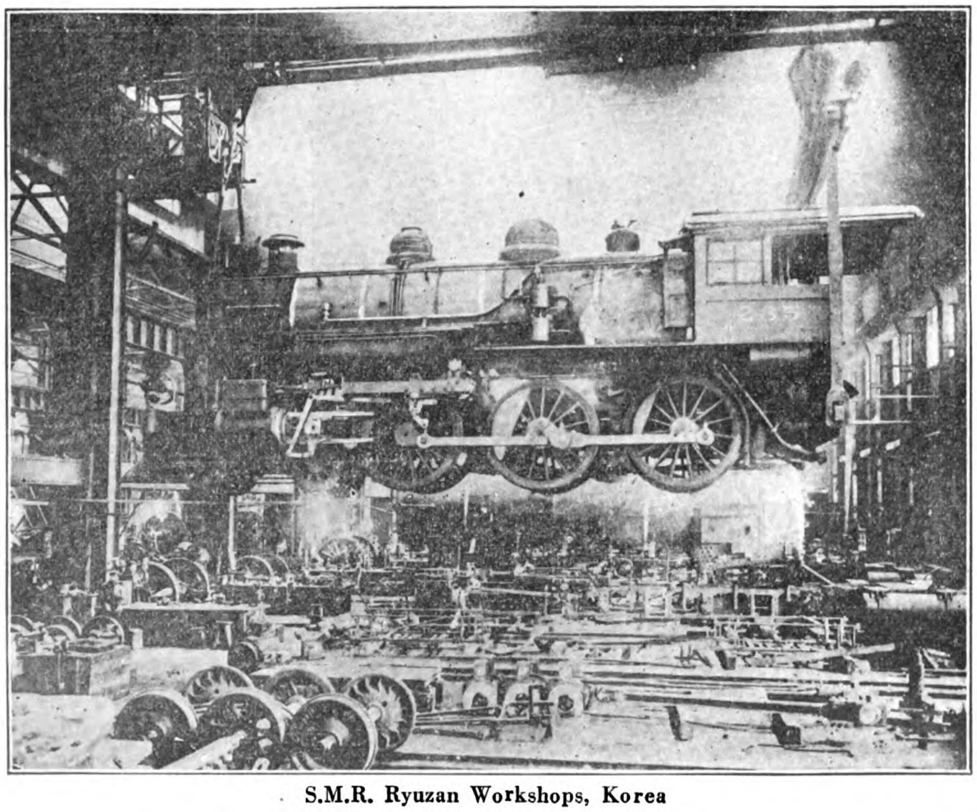
There are 34 joint stock companies (Kabushiki Kaisha), 7 Goshi Kaisha (Limited Partnerships), and 4 Gomei Kaisha (Unlimited Partnerships), engaged in agricultural production in Chosen. Their total capitalization amounts to Y. 33,009,000, of which Y. 20,980,100 is fully paid up.



S.M.R. Ryuzan Workshops, Boiler Shop



Engine Room



S.M.R. Ryuzan Workshops, Korea

All these companies capitalized at more than Y. 500,000 are given in the following table:—

Name	Address	Paid-up Capital *Yen*
Chosen Nogyo K.K.	Keijo	150,000
Koeki Shokusan K.K.	Seishu, Shusei Hokusho	1,000,000
Sannan Shokusan K.K.	Rinzan, Chusei Nando	280,000
Chosen Menka K.K. (Raw Cotton)	Mokuho	1,325,000
Fuji Kogyo K.K.	Keijo	2,200,000
Nakamura Gumi K.K.	Keijo	6,000,000
Nakashiba Sangyo K.K.	Kintei, Zenra Hokudo	500,000
Namboku Mengyo K.K.	Keijo	500,000
Namsen Kogyo K.K.	Koshu, Chusei Nando	125,000
Zannan Shokusan K.K.	Koshu, Zenra Nando	2,000,000
Chosen Nogyo K.K.	Karatsu, Chusei Nando	250,000
Fukudo Noji K.K.	Mokuho	500,000
Koryoku Nojo K.K.	Kanpei, Zenra Nando	300,000
Chosen Moji K.K.	Daido, Heian Nando	125,000
Shinmin Koshi	Keijo	125,000
Mizuhi Mojo K.K.	Teishu, Heian Hokushu	750,000
Ohashi Nojo K.K.	Ekizan, Zenra Hokudo	1,500,000
Kokai Sha K.K.	Keijo	262,500
Tomita Goshi K.K.	Chinnampo	500,000
Kunitake Nojo K.K.	Mokuho	650,000

Coal Resources of Karafuto

(JAPANESE SAGHALIEN)

THE principal industry of Karafuto in the past was fishing, at present it is wood pulp making; in the near future it will be coal mining.

The general development of industry in Karafuto has not been remarkable; at the end of 1920, the value of all products for the year was officially reported at only Y.45,841,299, the greater part of which represented pulp and marine products:

Pulp	Y.21,952,830
Marine products	10,720,691
Timber and Lumber	8,497,194
Metals and Minerals	3,360,034
Agricultural products	1,061,297
Dairy products	249,246
Total	Y.45,841,299

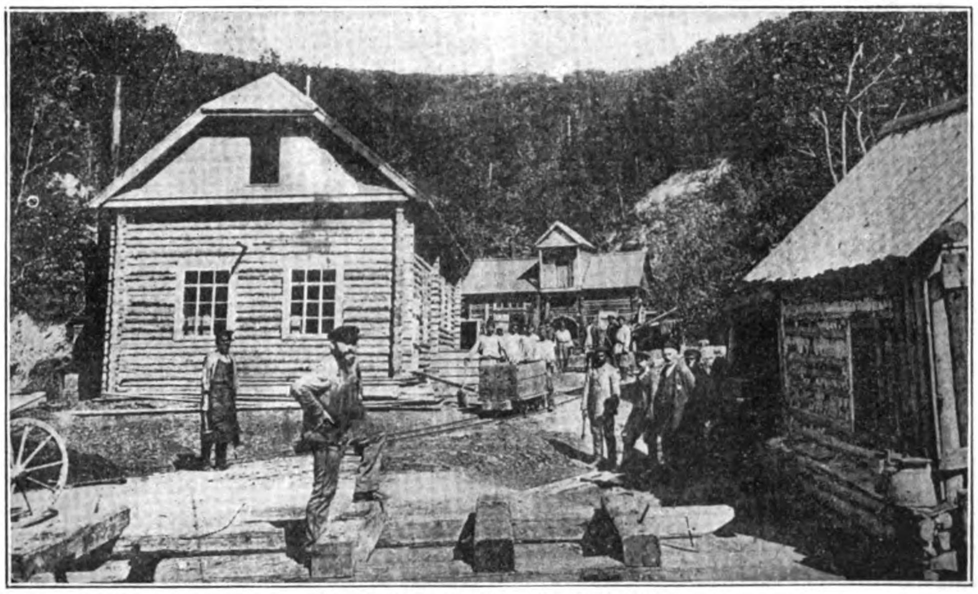
The mineral production was all coal.

From 1912, the production of coal in Karafuto has been increasing steadily:

1912, 415 tons; 1913, 83; 1914, 14,653; 1915, 27,626; 1916, 37,060; 1917, 57,830; 1918, 104,695; 1919, 135,427; 1920, 154,292.

At present, the only mines in operation are the Mitsui mine at Kawakami, in Toyohara Gun; the Karafuto Kogyo K.K. mine at Osakaye in Tomari Gun and also operated by this company on contract at Tomari in Tomari Gun; the Karafuto Tanko K.K. mine at Higashi Shiroura in Sakaehama Gun; and the Noboriko Tanko K.K. mine in Mototomari Gun. These mines produced in 1920: Kawakami, 1,114 tons; Noboriko, 39,964; Osakaye, 34,130; Tomari, 22,244; Higashi Shiroura Mines, 6,840; Total, 154,292 tons.

Besides these, there is also the Noda Samu Tanko K.K.'s mine which in 1917 produced 27 tons and 489 tons in 1918, but is now abandoned.



An Old Russian Mine in Saghalien

Despite the slow development of industry in Karafuto the present production of coal is not enough for the local needs and in 1920, about 50,000 tons had to be purchased from Japan proper. This shows conclusively how little the coal resources are developed. Some of the reasons the industry is so little advanced are the lack of railway communication, insufficient means of transportation and no effective harbor equipment for loading. These are minor reasons, however, the main reason is the government's action in nationalizing the main coal districts and closing them to private exploitation. The government justifies this action by pointing to the wasteful mining methods employed by small mine owners whose operations are usually speculative. The Karafuto coal deposits have always been considered too valuable to permit them to be exploited for individual profit and from the very first the government took the stand that they should be held as a reserve and for colonization development only. The intention has been to open the mine fields as industry developed and then only by the most modern mining methods.

The coal fields now closed to private exploitation include 500 sq. miles in the north, 150 sq. miles in the central and 500 sq. miles in the south, in all 1,150 sq. miles. In these districts there are many parts which have not yet even been surveyed. In the north only 85 sq. miles have been surveyed, in the central part, only 12½ sq. miles and in the south 15 sq. miles, in all 112½ sq. miles.

The Karafuto Kogyo's leased mine in Tomari is in the central part. This mine is government property. Despite the large area included in the government enclosure, there are still many very promising mine fields located on the outside. Coal mining in Japan has reached the limit of its development and Japanese coal miners are beginning to turn their attention to Karafuto in search of new fields to open.

Among those seeking for mining rights in Karafuto are the Mitsui Bussan K.K., the Furukawa Mining Co., the Mitsubishi Mining Co. and the Okura Co. At the end of December, 1921, these companies petitioned the government for licenses to mine in 1,112 different places outside the restricted areas.

Applications for licenses to mine, gold, silver, copper and to bore for petroleum amounted to 10 per cent. of this total. More than 1,000 applications were for coal. Most of these prospects are along the western coast of the Japanese territory.

Saghalien coal is particularly valuable in the manufacture of coke. Japan is lacking in good coke-making coal. According to reports there is an enormous quantity of this coal available. One company says that there are about 100,000,000 tons of coal in prospect in one sq. mile of their surveyed land. Some of the seams surveyed are from 30 to 50-ft. wide. The department of agriculture and commerce is rumored to have discovered one seam 150-ft. wide in the north district.

Because of the limitations placed on production by the climate, domestic capitalists at first balked at exploiting the Karafuto mines. The prefectural government has now completed construction of 60 miles of railway from Maoka to Nodasamu and from the end of 1921, the line between Nodasamu and Hisaharu has been doubled. More than Y.4,950,000 has been spent on Odomari harbor, Y.2,950,000 on Maoka harbor, and Y.2,500,000 on Honto harbor. These will be ice-free ports when construction is completed and thereafter export will be materially assisted.

Bangkok Terminus of the Royal State Railways of Siam

Siamese State Railways

THE 24th annual report of the Siamese State Railways for the year ending March 31st, 1921, shows a decrease in the gross receipts for the standard gauge lines of Tcs. 5,787,090, a decrease of Tcs. 544,263 or 8.60 per cent. under the former year, attributed to general trade depression. The working expenses were Tcs. 2,748,502 or 47.49 per cent. of the gross receipts. The net dividend after making due contribution to the renovation fund was 4.51 per cent. on the capital outlay of Tcs. 60,602,610, compared with 5.71 for the previous year. The total length of standard gauge line remains 950.5 kilometres.

The metre gauge lines (1,302 kilometres opened to traffic) have a capital account of Tcs. 64.453,190 or 50,871 per kilometre. The gross earnings were Tcs. 3,864,369 as compared with 3,926,589 the previous year, a drop of Tcs. 62,220 or 1.58 per cent. The working expenses were 2,259,916 an increase of 7.43 per cent. over the previous year, and 58.40 per cent. on the gross receipts. After deducting 322,266 for the renovation fund, the net profit was 1,215,187 or 1.58 per cent. on the capital.

Rolling Stock

During the year the remaining 18 locomotives out of the 25 ordered from the North British Locomotive Company were delivered and 17 placed on the southern lines and the remaining eight kept ready for the eastern and north-eastern lines. The total number of locomotives were 62 for the standard and 62 for the metre gauge lines. Eight first and second-class bogie passenger coaches, eight bogie vans and four bogie third-class carriages were received from the Metropolitan Carriage, Wagon and Finance Company during the year, while an order for six bogie restaurant and three bogie sleepers was placed with Cravens, Ltd., in October. 1920. The total number of carriages at the end of the year was 193 standard gauge and 119 metre gauge, or 312 for all lines.

The work of erecting and building bodies for the 200 underframes for the metre gauge goods wagons received during the year from the Metropolitan Carriage, Wagon and Finance Company, Ltd., was carried on. Other goods rolling stock was received from Baume et Marpent and the Midland Railway Carriage and Wagon Co., Ltd. The total number of goods wagons in service at the end fo the year was 891 standard gauge and 787 for the metre gauge.

Distributing channels take off from the main canal and the two branch canals, and from these again minor channels and water courses deliver the water on to the individual cultivator's fields. The main canal, the western branch canal and the system of distributing channels connected with these are nearing completion, and actual irrigation from them will commence for the rice crop of 2465 B.E.

The area to be protected annually by direct irrigation is estimated at 100,000 hectares, or 625,000 *rai*. Furthermore by linking up the new system with the old communication canals and creeks to the southward of Ghlong Hok Wah Sai Lang and utilizing the surplus water of the Menam Nakonayok, a copious flow of fresh water will be provided for the great and fertile, though low-lying plain, bounded by the Rangsit area on the north, the Menam Chao Phya on the east and the sea on the south. This water which will replace the noxious saline fluid, inimical to plant and animal life, that now stands in the canals and creeks of this area for a great part of each year, will supply irrigation of the kind known as indirect, or flood irrigation, consisting of the alternate flooding and draining of the land by one and the same set of channels according as desired. Thus in addition to the area directly affected, a very large tract will be indirectly benefitted by the system. It is to be noted that to obtain the best results in rice cultivation an efficient drainage system is practically as important as the supply of water.

The revised estimate for the Prasak project at present stands at Tcs. 13,300,000 and the expenditure up to March 31st 2463 is as follows :

2458 B. E. (1915-16)	.. ..	Ticals	388,402*
2459 B. E. (1916-17)	.. ..	,,	1,273,559
2460 B. E. (1917-18)	.. ..	,,	1,664,015
2461 B. E. (1918-19)	.. ..	,,	2,655,382
2462 B. E. (1919-20)	.. ..	,,	2,495,812
2463 B. E. (1920-21)	.. ..	,,	3,884,289
Total	..	Ticals	12,361,459

*Includes expenditure on other projects Tcl. 238,815.24.

Of the above sum Tcs. 2,000,000 has been expended on machinery, stores and plant which will be available for use on other projects if sanctioned.

At the present time the Siamese State Railways are composed of two different gauges, namely, standard gauge (4-ft. 8½-in.) on the east side of the Menam Chao Phya and metre gauge on the west side. Arrangements are being made to convert the entire system to metre gauge, and already a third rail has been laid on over 150 kilometres of the standard gauge lines, from Bangkok to Petriu and from Bangkok to Ban Phaji. The reasons for altering the gauge are paltry, in order to standardize the rolling stock, thereby effecting a considerable economy in spares and stores, and partly in order to render the entire system the same gauge as those of the Burma, French Indo-China and Federated Malay States Railways, with a view to making it possible at a future date to run through trains between all of the principal cities of South Eastern Asia.

The state railways were at one time to all intents and purposes organized as two separate railways. They remained so until July, 1917, when for a economic reasons the two railway system were amalgamated under the present commissioner general, H.R.H. Purachatra, the prince of Kambaeng Bejra.

The construction of the standard gauge state railways commenced in 1892 and the line from Bangkok to Ayudhya (71 kilometres) was opened in 1897. Since that time the line has been extended to Korat a distance of 264 kilometres. The northern line branches off from this line at Ban Phaji junction (kilometre 90) and from that point to Chiengmai the line is open to traffic, a total distance of 756 kilometres, from Bangkok, the last section from Pang Yang to Chiengmab having been opened to traffic on 1st January, 1922. A short line (69 kilometres) runs due west from Ban Dara junction, rotation on the northern line, to Sawankaloke. The eastern line running from Bangkok to Petriu (63 kilometres) was opened in 1908. The river line (6.5 kilometres) connects Makasan on the eastern line with the railway wharf on the Menam Chao Phya. The total length of all the standard gauge lines open to traffic is 1,025 kilometres.

In 1909 a second railway department was formed to build railways in the peninsula. This line known as the southern line is a continuation of the metre gauge line from Bangkok Noi to Petchaburi (150 kilometres), which was opened in 1903. From Petchaburi the line runs almost due south, passing through Prachuab Kirikan (Koh Lak), Bang Sapan, Chumpon, Lang Suan, Surashtra Dhani (Bandon) to Tung Song, where there are two branch lines, namely, the Nakon branch, and the port of Kantang branch. From Tung Song, the southern main line runs to Perlis boundary via Patalnug and Haadyai junction, joining up with the Federated Malay States Railways at Padang Besar, and the eastern branch of the southern main line, branching off at Haadyai and running through Mondhol Patani, joins up with the F.M.S. railways at Sungei Ghok on the Kelantan border. There is also a branch line to Singorol from Haadyai through Ootapao.

The through service between Bangkok and Penang was opened in July, 1918, three days being necessary for the trip, but since January 1st, 1922, arrangements have been made to operate a sleeping car service between the two points and reduce the running time to 36 hours. With the exception of some minor works the whole of southern line is now completed, the last section on the Patani branch from Balaw to Sungei Golok having been opened to traffic on 1st November, 1921.

The government has scheduled large extensions and many important works for completion during the next few years. Among the most important of these is the bridge over the Menam Chao Phya at Bangkok, which will join the two sections of the state railways after the gauge has been standardized into metre gauge. The administration will benefit by this measure considerably, being able to obtain an effective control for traffic purposes over the whole network of state railways, and to effect through running, not only over the whole Siamese system, but, by arrangement, through passenger and goods traffic into the neighboring states.

The proposed extensions comprise over 500 kilometres of new line, included in which are a line from Petriu to Aranya Pradesa a point within a few kilometres of the Cambodian border, and the north-eastern line from Korat to Ubol.

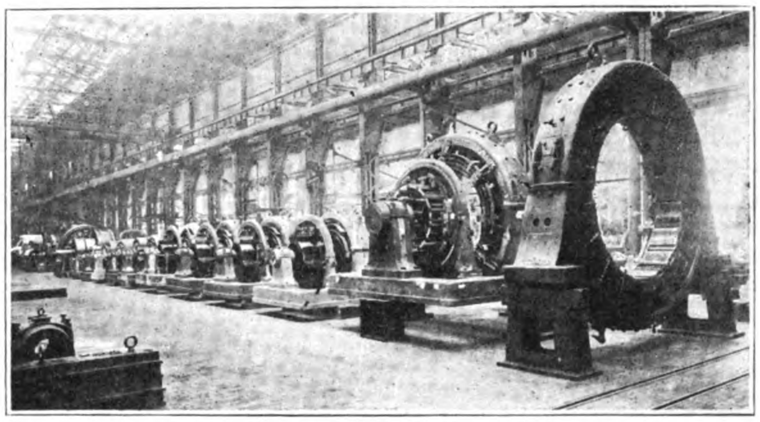
By far the most important event in the history of railway organization in Siam was the promulgation on 15th August, 1921, of a law on organization of railways and highways. The law establishes the department of state railways on a sound administrative and commercial basis, providing for the safety of the lives and property of the traveling public, facilitating consignment of goods, a fair and just method for the acquisition of land, and an effective control of private and industrial railways.

The measure of putting the roads and other highways in the provinces under the railway administration has been well adapted to the present peculiar needs in a country where roads as known in other countries do not exist outside the towns. Opportunity has now been given to devise and organize a comprehensive transport scheme, wherein roads will serve as feeders to the railways at important trading centres, and to augment the roadways and waterways where necessary, that is to say, where traffic justifies transport by road in addition to waterways and railways.

The private lines open to traffic amount to 106 kilometres.

English Electric Company

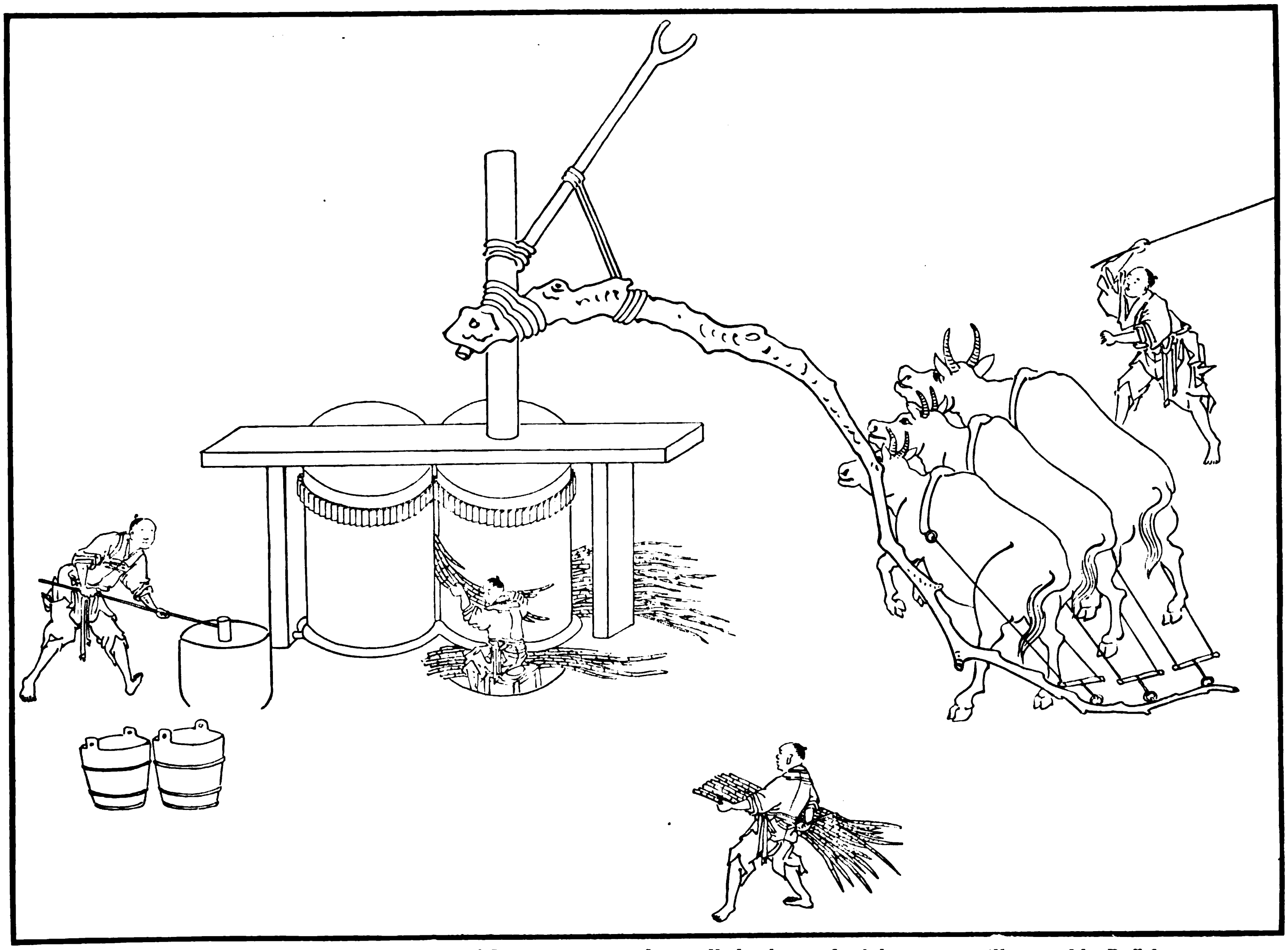
The illustration shows a number of rotary converters in various stages of construction. The frame on the right-hand side of the picture belongs to a very heavy current low voltage machine designed to give a direct current supply for rolling mill work. The armature belonging to it may be seen at the extreme left-hand side of the picture. This is designed to carry about 6,000 amps. and the special double-commutator construction can be clearly seen.



Next to the frame of this machine are a number of parts of 1,500 KW. machine for municipal service, designed to run at 42 R.P.M. and still proceeding to the left, we have machines of 1,100 KW., 1,000 KW., 500 KW. 250 KW., and 200 KW.

In addition to the above, four or five more machines were running on the test bed at the time, varying in output from 1,500 KW. down to 200 KW., and the modifications in design between the largest and the smallest sizes of some 15 machines dependent upon the conditions of service and the frequency of the alternating current supply form a most interesting and attractive study.

We understand that the English Electric Company intend to build all their rotary converters for industrial or municipal service at the Siemens Works, Stafford, which are exceptionally well laid out to deal with a wide range of machines, suitable for the varying conditions of periodicity and voltage met with in general municipal and industrial service. Another part of the same works is devoted to the manufacture of the whole of the A.C. and D.C. switchgear necessary to control the rotary converters, while the step-down transformers for working in conjunction with the converters are manufactured by the same company at their Coventry Works, so that the English Electric Company are in a position to furnish the entire equipment of a rotary converter sub-station from the products of their own factories.



Chinese Native Sugar Press; 450,000 tons of Sugar are extracted annually by thousands of these stone mills turned by Buffaloes

The Cane Sugar Industry of China

EDITORIAL FOREWORD. The project for the erection of a $5,000,000 sugar refinery in the vicinity of Shanghai invites attention to the state of an industry, which, like all things Chinese, rests its fame on past performances. With a domestic production estimated at 450,000 tons of open kettle sugars, and imports of 350,000 tons, the annual consumption may be placed at 800,000 tons, a per capital consumption of about four pounds annually, a market which any other government but that of China would make some serious attempt to preserve and develop for a home industry.

It seems to be taken for granted that lack of transportation facilities and imposition of *likin* make it impossible for China to ever become a factor in the world's sugar market. If we accept that the provinces of Szechuan, Hunan, Kiangsi and other interior districts are to become the future sugar producers of China, that statement would hold good, but we are of the opinion that any great development of the industry will take place in the provinces of Kwangtung, Kwangsi and the island of Hainan, in districts either on or adjacent to the sea coast, or within easy narrow gauge railway haulage. To our mind, the greatest obstacle to the operation of modern central factories arises from the fact that the land is split up into such small holdings (properties of families and clans handed down for generations) which are difficult to acquire to form an estate and just as difficult to count upon for a guaranteed supply of cane to justify the erection of a central factory. Without this guarantee of cane supply and enforceable laws that will indemnify the factory in the event of failure on the part of the planters to live up to contracts for the supply of cane, the development of the sugar industry along lines which have proved so successful in other countries, is almost impossible.

The likin barrier undoubtedly constitutes one of the greatest obstacles to the development of a home industry operating as it does as a discrimination against the Chinese themselves. Imports from foreign countries pay the five per cent. *ad valorem* duties and are shipped to the interior with a surcharge of 2½ per cent. tax, free of all further *likin* impositions. Chinese-made sugar on the other hand, is taxed at every *likin* barrier, which practically prohibits the export of sugar outside the producing province. Even this, however, would not operate immediately against the establishment of a modern mill, as each province could for some time consume its output.

Some years ago, the great British firm, Jardine, Matheson & Company, operating a sugar refinery at Hongkong, established a branch refinery at Swatow, the heart of the Hankiang cane sugar district, but the native officials and sugar dealers' guild brought pressure to bear upon the planters to restrain them from dealing direct with the foreigner. Unable to secure the necessary raw materials or of enforcing contracts for deliveries, even if entered into, the British firm was finally forced to give up the fight, close the refinery, dismantle the machinery and ship it to Hongkong.

The building and high chimney still stands dominating the port of Swatow, a permanent monument to Chinese obstructionist methods.

In 1913-14, at a time when it looked as though China would settle down under the firm rule of Yuan Shih-kai, the publisher of this magazine endeavored to put some life into the cane sugar industry of South China, and in order to interest foreign capital in erecting central mills, prevailed upon the Chinese government to grant a subsidy to the extent of guaranteeing eight percent on the capital actually invested in such enterprises. The government was also prepared to strengthen the weak point in the central factory system by providing the necessary guarantees that a stipulated amount of cane would be delivered at the mills under an equitable contract between the mill owner and the farmers. In this respect, the old Chinese officials at Peking deserve considerable commendation. They went as far as they could to induce foreign capital to come and have a " look see " at the industry and install an experimental plant somewhere in South China. Financial conditions in the United States and the instability of China's internal affairs however decided those interested in new sugar enterprises to reject the proposition. The war precluded any hope of resurrecting the scheme.

From the following memorandum submitted by the ministry of agriculture and commerce to the president some time during the month of November, 1914, it will be seen that the Chinese authorities made a careful study of conditions surrounding the creation of a modern sugar industry in China and practically adopted the main features of the system which proved so successful in developing the industry in Formosa :—

" Through want of improvement the sugar industry of this country has been declining all the time, and as shown in the customs return, the import of foreign sugar has increased tremendously, while the export of Chinese sugar has dwindled to nothing. Owing to the European war the colonies of foreign powers where sugar is produced have been affected, and it is certain that in the coming year the world will be in need of sugar. Hence it offers a most important opportunity for the Chinese to improve the manufacture of sugar so as to supply the needs of the world. The Ministry after considerable discussion desires to offer two suggestions for the improvement of the sugar industry, namely, (1) to fix districts, and (2) to institute investigations.

" The cultivation of sugar canes and the manufacture of sugar must depend upon each other. They must be in proportion, and if there are too many sugar factories in one place there will not be sufficient sugar canes for them to manufacture sugar. Therefore when applications are made for the establishment of sugar factories the districts will be fixed according to the capital of the factory. Again with a certain district all sugar canes produced there should be sold to a particular factory, thus it will prevent the raising of prices.

" In almost all foreign countries, the manufacture of sugar is strictly inspected by the authorities, but there is no such thing in China. The sugar merchants of this country have always put some mixture in either red or white sugar so as to make more money without giving any consideration of the injury they have done to their trade. Consequently the people of this country prefer to use foreign sugar though it is more expensive.

With the above corrupt state of things, there will be no success though the government has promulgated a set of regulations encourageing sugar plainting and guaranteeing the interest for the capital of the company. This ministry has made the following proposals : (1) When any person wants to manufacture sugar, he must send an application to the ministry of agriculture and commerce, requesting that the sugar canes produced in a certain district be sold to him for the manufacture, and the material for the manufacture shall be sugar canes or sweet vegetables. (2) After the district has been assigned to any person, no other factories shall be established there. (3) All the sugar manufactured should be subjected to the inspection of the authorities. (4) Those factories which have been established before the promulgation of the present system shall register themselves in the ministry within the 4th year of Min Kuo. If the above plan be carried into effect, the sugar industry will soon be developed.

The President's Reply : The above petition is hereby approved, and the ministry concerned is ordered to put it into effect.

In January of the following year, President Yuan issued a mandate promising that the government would lend to any sugar factory a sum of money equivalent to five percent of its paid up capital, hoping thereby to encourage the formation of native sugar companies. In March of the same year, the minister of agriculture telegraphed to the governors of the southern provinces the offer of the government and urging wealthy people to invest in modern sugar mills in order to supply the home demand. This also failed to produce results. China let a golden chance slip by during the war, and it is hardly probable for some years to come that the central government will be in any position to follow up its sugar development program of 1914, and if guarantees of interest on invested capital is essential to the development of the industry, these subsidies and other aids must emanate from the provincial governments.

The success of a modern cane sugar industry in China will depend largely upon the selection of proper districts, the importation of new seed cane and the erection of suitable mills, under laws that will guarantee the latter from competition and assure to them that the farmers will live up to their contracts to supply the cane. We are of the opinion that it would be extremely difficult to find a district where a 500 ton mill or over could be erected with reasonable prospects of success, and our judgment would be that the Chinese would have to be educated little by little to the use of modern machinery by starting in at the bottom with a cheap and efficient steam mill giving a maximum extraction operating with open trains, and then gradually expanding these mills, by the introduction of evaporating apparatus, centrifugals, etc. Once the Chinese can be shown that the saving in extraction alone will pay for a steam mill in one crop or two, and the foreigner is willing to extend long term credits, an opening can be made. The future of the cane sugar industry therefore depends largely upon education.

We also incline to the belief that the best results would be found somewhere in Kwangsi or on the island of Hainan, for although the Swatow district and other parts of Kwangtung are already devoted to cane cultivation, whenever the pressure of the staple food supply is great, that is, when the price of rice increases, the tendency is to increase the rice acreage.

This tendency is witnessed in Formosa where the industry is under strict government supervision. The same is true in other parts of the Far East. For this reason, we believe that the unsettled districts of Kwangsi province and the island of Hainan offer the most favorable opportunities for the establishmnet of a modern cane sugar industry in China. Because of their geographical situation within the tropics, climatic and soil conditions in these sections would assure a higher sugar content in the cane than would be possible in the Upper Yangtze regions or Fukien. The island of Hainan, situated outside the zone of political disturbances having an area almost as great as that of Formosa and abundance of cheap labor, seems ideally located for the establishment of the industry. A little initiative with ordinary risks coupled with sufficient government protection and, if necessary, subsidies, and the proper selection of a district in close promiximity to deep water, seem all that is needed to build up a profitable home cane sugar industry in China.

Notwithstanding the proverbial business honesty of the Chinese, this trait cannot be said to extend to their preparation of certain commodities for the market. The adulteration of tea lost for them the great tea trade of the world and handed it over to more honest merchants. Similar adulterations of native sugar has driven even the Chinese consumer to purchase the foreign article, and any attempt to build up a modern sugar industry, would have to be done under strict government supervision, especially if an official subsidy, guarantee, or aid of any kind is extended.

Furthermore, we are also of the opinion, that the time is past when the Chinese will consent to foreign capital controlling an industry of such magnitude as the sugar. A couple of years ago, there was much talk of Chinese-American and other foreign cooperation, but as far as we have been able to gather, this talk was all one-sided, emanating from the foreigners and not from the Chinese. Experience has proven that cooperation with the Chinese when it comes down to brass tacks, takes the form of Chinese control of the enterprise, in which they are willing to utilize up to 49 per cent. of foreign capital with foreign technical supervision, pending such time as their own experts can be educated.

In applying this condition to a solution of the cane sugar industry, the best that the foreigner can hope for is a participation in the capital and the profits from selling and installing the machinery, with perhaps a participation in the profits in return for technical supervision. Or, the precedent created in the Philippines might be followed in a modified way, in which the government would contract with a foreign concern for the erection of the plant and its

supervision, and at the expiration of a number of years, the plant would revert to an association of native planters who supply the cane. G. B. R.

* * *

Notes on Cane Sugar in China

The exact date when sugar cane was introduced into China is not known, but from the " Botanical Classification " compiled during the Ming era, and other standard Chinese works, the manufacture of sugar seems to have been introduced amongst the Chinese for the first time during the reign of Emperor Tai Tsung in the Tang dynasty, in the early part of the seventh century. So it may be accepted that the history of sugar in China goes back over a thousand years, and from the state of the industry at the present time it is apparent that it has not progressed one step since it was first started. The methods handed down from their ancestors have been preserved in all their crudeness with the result that the once flourishing industry gradually declined until the greater part of the consumption is now supplied by foreign, and especially Java refined sugar.

Primitive Methods

The methods employed in extracting sugar from the cane are primitive in the extreme. The following description of the process will cover the entire field in China :—

During the harvesting of the sugar cane a number of small rough sheds are erected for the manufacture of the sugar. Outside each shed there is a set of presses, driven by two oxen or buffaloes. Inside are three or four large iron pans, placed over a shallow ditch, which constitute the boilers.

The mill consists of two granite rollers, fixed perpendicularly to a wooden frame. These wheels are turned by a long lever, one end of which is fixed to the upper axle of one of the wheels, and the other connected with the yokes of buffaloes. The animals are driven round in a circle, and small bundles of sugar cane fed between the revolving rollers. The juice flows into a large earthenware receptacle beneath the wooden frame. Any person with ordinary intelligence can work the pressing apparatus, and it is generally managed by the farmer and his family, but a little skill is necessary for boiling the juice, and this is usually done by an expert.

After the juice, previously mixed with a little lime and tung oil (wood oil), is boiled to the required consistency, it is removed from the boilers by a large ladle and put in shallow bamboo pans, where it is left to criptalyze into brown sugar bricks. When the sugar season is over, the sheds are pulled down and all the apparatus removed except the stone rollers. The sheds are erected and fitted up annually.

The places noted for the production are largely in the south where the climate is warm, although a considerable industry is located in Szechuan. The provinces of Kwangtung and Fukien produce about half the estimated production, the greatest producing areas being located in the Hankiang, Lukiang and Kinshi valleys. In olden times, the Canton delta was extensively cultivated to sugar cane, but the ground is now given over largely to orchards and the mulberry tree.

The Hankiang Valley

The Chaochow district of Kwangtung, or the region back of Swatow heads the list in regard to the production of sugar with an area planted to cane estimated at nearly 20,000 acres. The seed is planted early in the spring and harvested in ten or eleven months. It is said that at least three ratoon crops are obtained from the original planting in this district. Bean cake is largely used as a fertilizer and the number of small mills in operation is said to be over 2,000 producing over 1,000,000 piculs a year, or a yield of over three tons to the acre.

The industry in this district reached its high water mark in 1899, after which a steady decline in production and exports set in due to the gradual displacement of the native sugars by imports from Java, Hongkong and Japan. The once great industry of this district met the same fate that befell China's tea trade. Adulteration, poor quality and refusal to install modern machinery lost the home market to sugars from other countries. The taste for the cleaner and cheaper article throughout China was being generally acquired, which was not offset, as was hoped by being used as an ingredient in dyeing silk piece goods. Orange orchards begin to take the place of the cane fields and the industry seemed to be on its last legs when a new demand was created as a result of the war. This however has fallen off and the industry is again at a low ebb.

There are two varieties of cane produced in the district, one reddish in color, 5 to 7 feet tall, and over 1 inch in diameter ; the other called the white cane, which is 6 to 8 feet high and 1 inch in diameter. The former in its natural state is popular with the natives, who chew it because of the excellent flavor of the juice ; the latter is used for crushing to obtain the sugar that is marketed.

Fukien Regions

In the Lukiang and Kinshi valleys the cultivation of cane is carried on extensively near Chuanchow and Changchow. Here the annual output, estimated at 300,000 piculs finds its market through the port of Amoy.

The prevailing climatic conditions in the district makes it well suited for the production of sugar cane.

But the local production does not begin to meet its requirements in sugar consumption. In fact, sugar is one of the larger items of import into Amoy ; the imports of brown, white, and refined sugar during the year from 1914 to 1919 being :

Year.	Brown sugar. Tons.	Brown sugar. Value.	White sugar. Tons.	White sugar. Value.	Refined sugar. Tons.	Refined sugar. Value.
1914 ..	363	$16,358	6,888	$418,720	1,161	$ 73,037
1915 ..	442	21,445	1,201	91,419	4,140	356,142
1916 ..	66	4,337	3,537	299,874	3,081	339,960
1917 ..	64	4,578	2,027	191,654	1,465	189,660
1918 ..	115	9,257	4,612	550,954	4,197	608,949
1919 ..	246	34,709	2,524	448,628	2,415	536,407

The sources of many of these imports are Singapore and Samarang, while most of the refined sugar reaches Amoy from Hongkong. Amoy is the only port of entry into the district.

The district has a small sugar-candy industry, but here again the imports far exceed the exports. Exports go principally to overseas Chinese in the Philippines, Formosa, the Straits Settlements, and the Dutch East Indies. Imports are mainly of British and Chinese (Shanghai) manufacture.

Accurate statistics regarding the area in the district planted in sugar cane are totally lacking. According to a consular report a fair valuation of the crop would perhaps be about $500,000, or about one-third of the value of the district's annual consumption in sugar. The section in which the most cane is grown is around Siokhe, Pholam, and Ticthoa, all in the Changchow prefecture.

It was thought at one time that a profitable sugar industry could be established in the Amoy district. Several mills with more or less modern equipment were started in Changchow and at other points in the cane-raising region. *But the high hopes entertained were not realized, for the reason that the growers failed to supply the mills with sufficient quantities of cane to operate on a paying basis.* The mills were forced to close down, and to the present time have not been reopened.

Canton Delta

This region was famous for sugar production in former years but the industry is now confined to Tungkwan and Waichow where brown, white and candy sugar is made. The annual production is said to reach as high as 400,000 piculs, but this is perhaps an overestimate. The output is exported through Canton, Kowloon and other ports. Cane is also grown and crude sugar made and exported from the island of Hainan, the province of Kwangsi and Chekiang. In fact, in nearly every place in south China sugar cane is cultivated in small patches.

Kiangsi Province

Tangkiang in the Kanchow district of south Kiangsi is also a sugar centre of some importance. Here the practice is for a few hongs who engage in its manufacture to contract with the farmers a few months ahead for the supply of cane which is paid for on a fixed percentage of the sugar extracted and at a fixed price. This would seem to be the central factory system in a crude form, and might serve as the starting point at some future date for a modern central factory contracting for its supply of cane in the district.

Szechuan Province

Out of a total estimated production of 400,000 tons of sugar, for the whole country the province of Szechuan produces one third, or 133,000 tons.

Large quantities of sugar cane are grown in West China, one variety of which—reddish-purple in color and 5 to 8 feet in height, with a diameter of 1 to 1½ inches—is sold in its natural state for chewing, being succulent and of excellent flavor. The crop is harvested in November, but the canes are buried in such a way that they keep for many months and are taken up and sold according to the market demand.

The cane from which sugar is made is known as white cane and is considerably taller, though of smaller diameter, than the red variety. It is very rich in sugar content and is a most important crop in the Neichiang and Tzechow districts. This cane also ripens in November, but is frequently seen in the fields as late as February.

A few years ago influential Chinese interested in the sugar industry desired to improve the methods of cultivation and to obtain sugar-cane seeds or cuttings from the United States or the East Indies, so that a better quality of cane could be produced.

The promoters of the scheme collected $158,000 United States currency, and compromised to raise $236,000 more if necessary to erect a factory to produce 30 tons a day. Enough cane is grown to keep such a mill in operation. Altogether there are about 48 sugar districts in Szechuan, the most important of which are Chienyang, Tzeyang, Tzechow, and Neichiang. Chienyang and Tzeyang alone are said to produce about 40,000,000 pounds of sugar a year, and it is estimated that five times this quantity is produced in Tzechow and Neichiang. Sugar cane in these districts is cultivated, for the most part, along the river banks, greatly facilitating transportation.

Refineries in China

It is difficult to obtain detailed information about the equipment and outputs of the two Hongkong refineries. The Taikoo Refinery owned by Butterfield & Swire is operated as a private enterprise and no reports are published. The China Sugar Refining Co. Ltd., of which Jardine, Matheson & Co. are the general agents, however, is a registered Hongkong Company capitalized at $2,000,000 (silver) divided into 20,000 shares of $100 each fully paid up. The gross profit for the year ending December 31, 1920, including credit balance of $33.806 from the preceeding year was $2.996,741. The company paid an interim dividend of $15 per share on August 21, 1920 ($300.000) and a final dividend of $65 per share ($1,300,000) a total of 80 per cent for 1920, carrying forward to the 1921 account $75.781. The Company's assests in land, buildings and machinery, which embrace the East Point Refinery at Hongkong, the Hongkong Distillery and the Swatow property are valued at $1,149,990. The distribution of the profits for the year ($2.996,741 is evidence of the sound and conservative financial policy pursued by this enterprise. This was apportioned as follows: Sugar fluctuation account, 700,000; equalization of dividend fund, 300,000; Employees' provident fund, 100,000; building reserve, 140,000; write off patent rights. 50,000; bonus to staff, 30,960; dividends, 1,600,000; carried forward, 75,781.

These figures may also give some indication of the prosperity enjoyed by the larger but private enterprise of the Taikoo Refinery. This magnificent showing made by the Hongkong refineries undoubtedly influenced the Chinese in Shanghai to have a refinery of their own located outside the settlement in territory under Chinese jurisdiction. The company, like all new enterprises in China, is being launched as a patriotic venture in order to create the proper atmosphere for the sale of shares. The promoter, Mr. M. Y. San, is the head of the largest and most successful confectionery business in China, whose products are gradually displacing imported biscuits and candies for native consumption. The prospectus of the new Chinese National Sugar Refining Company, Ltd. calls for a capital of $5,000,000 (mexican) divided into $50 shares, of which one quarter is to be paid in immediately. There are forty organizers of the new enterprise, including such well known names as Chang Chien, C. C. Nieh, C. T. Wang, Li Ching-fang, Chang An-sun and others. Four-fifths of the capital has been allotted to the organizers, and the other fifth placed on the market. The prospectus states that the profits of the enterprise will be divided as follows: 55 per cent. to the shareholders; 10 per cent. as a special bonus for the organizers; 10 per cent. to pensions and reserve funds; and 25 per cent. as bonus for directors, auditors, general manager, staff, etc. The bonus appropriation of prospective dividends would seem to be liberal enough to cover all necessary calls upon the company from official sources, and indicates that the enterprise is expected to be extremely profitable.

Malayan Match Factory

With the ultimate objective of supplying the entire market of the Malay peninsula, Malayan Matches, Ltd., a concern capitalised at $1,000,000 (Straits currency) and registered in the F.M.S., commenced operations in the latter part of June.

The machinery, of German manufacture, was taken over from a defunct firm which had tried to operate in India. A company was formed to set up the plant in Malaya some three years ago, but an unexpected delay was encountered when the F.M.S. government refused to allow the company's engineer to enter the states, under the ruling barring Germans and Austrians. The Teutonic match expert was sent to Java there to await the efforts of the company to have him admitted. He finally severed connections with the firm, and an Englishman, Mr. D. J. Simons, was commissioned to install the plant, Mr. Simons is at present being retained as engineer in charge.

A labor force of 85 including Malays, Chinese and Tamils, mostly women and boys, are employed in the new match factory. The product, which is already on the market, is as yet a bit crude, but the labor has not yet been completely trained. Until the finished matches are considered of sufficiently high grade, the plant will not be run at capacity speed. When operating at normal, the output will be form 850 to 1,000 gross boxes per day, which is equal to the consumption of Malaya. While no effort will be made to invade outside territories, Company officials expect to displace a good portion of Japanese imported matches on the F.M.S. market, as the Malayan product is selling for $1.30 per gross, which is lower than the Japanese figure.

The plant is situated about 30 miles from Kuala Lumpur, F.M.S., near the Malayan collieries, and on the edge of a 16,000-acre forest reserve from which the material is drawn.

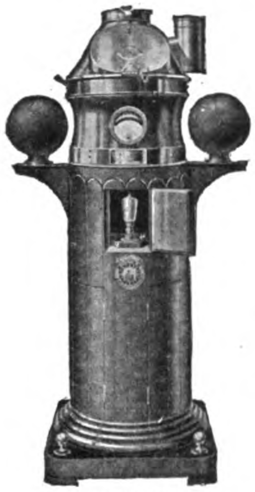
Messrs. J. A. Russel & Co., Ltd., Kuala Lumpur, are managers and agents for the new concern.

Navigational Instruments

THE navigator of the present day certainly owes a great deal of gratitude to the scientist for the developments made in connection with the navigational equipments fitted to modern ships.

In this work the late Lord Kelvin took a very prominent part. His inventions and additions in connection with the mariners' compass, sounding machines, etc., have been of the highest importance. Were it not for these scientific advancements, the safe navigation of the fast and up-to-date liner would be a matter of the greatest difficulty. Great attention is naturally given to the equipment of every new liner with the most improved and up-to-date compasses.

Messrs. Kelvin, Bottomley & Baird, Ltd., Glasgow, London and Newcastle, are the sole makers of the late Lord Kelvin's inventions, and have fitted the largest liners with their well-known compasses and sounding machines. The most recent vessels to be equipped with these instruments include: *Aquitania, Cameronia, Windsor Castle, Empress of Canada, Paris, Conte Rosso.*


"KELVITE"
Standard Compass

The standard compass on all these vessels is Lord Kelvin's patent, as illustrated. This compass is so well known that it is not necessary to describe it in detail.

Messrs. Kelvin, Bottomley & Baird, Ltd., a few years ago introduced a new scientific steering compass to the navigator, specially designed for positions where considerable vibration occurs.

This compass is known as the Kelvite Vertical Card Compass, the salient features of which are—

(*a*) A liquid bowl containing card of relatively small diameter, which ensures extreme steadiness and sensitiveness of the card.

(*b*) A greatly magnified image in a vertical plane of the part of the card which is in the vicinity of the lubber point is of considerable advantage. The complete card may also be viewed by the steersman through the usual sight in the helmet. This compass is designed to allow the card to be illuminated from above or below.

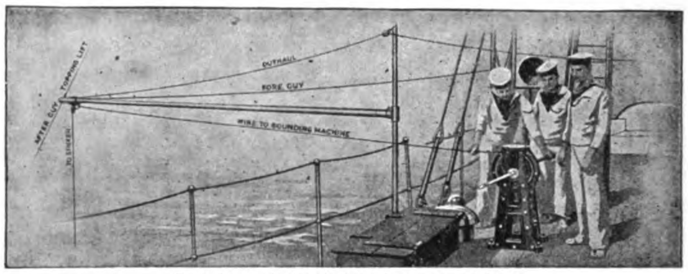
"KELVITE"
Vertical Card Compass

Another improved appliance supplied by Messrs. Kelvin, Bottomley & Baird, Ltd., to the *Aquitania* and other vessels is the latest form of Lord Kelvin motor-driven sounding machine. This instrument possesses distinct advantages over any other similar appliance, amongst others are that soundings can be taken from the navigating bridge instead of from aft, and that the navigator is able to read conveniently the depth of each cast for himself instead of being dependent upon a message conveyed from aft.

Large view magnified vertical image

The dial showing the amount of wire line run out is fixed on the top of the machine, so that, if the machine is fixed below the bridge, the dial can be read conveniently from above. The dial indicates accurately the exact length of wire out, and the figures are bold and clear to facilitate reading. While the depth may be ascertained in the usual way by means of the depth recorder or the chemical tubes, it is intended that with this machine the depth may be readily ascertained from the length of wire out. Tables are prepared showing the depth indicated for each fathom of wire run out with the vessel traveling at all varying speeds, consequently, when taking a sounding and the vessel's rate of speed at that moment being known, the corresponding depth for any length of wire can be instantly ascertained, the moment the lead touches bottom, by inspection of the tables.

"KELVITE"
Motor Driven Sounding Machine


Soundings being taken from Amidships

Messrs. Kelvin, Bottomley & Baird, Ltd., issue a quantity of interesting literature dealing with their unique manufactures, which can be obtained on application at their head office, 18 Cambridge Street, Glasgow.

*Messrs. Kelvin, Bottomley & Baird, Ltd., have introduced the term "Kelvite" which they apply to all their manufactures whether they be Lord Kelvin standard compass, sounding machine or otherwise. Messrs. Kelvin, Bottomley & Baird, Ltd., advise that the word "Kelvite" means manufactured by them and that would-be purchasers who desire the genuine articles should specify them with the prefix "Kelvite," thus: "Kelvite" Standard Compass; "Kelvite" motor-driven sounding machine, etc.

REVIEW

A book entitled "Universities and Scientific Life in the United States," has recently appeared from the Harvard Uuiversity Press, Cambridge, Mass., U.S.A. The author is Professor Maurice Caullery of the Sorbonne, exchange professor from France to Harvard University, during the war. Prof. Caullery is a biologist, and a man of keen observation not only in his own field, but in general affairs as well. He has presented the development, present status, problems and ideals of American university education from a fresh viewpoint, all too little heard from—the standpoint of the scientific man. His criticism of both American and European ideals will help educators in China in preserving a sane balance of thought on educational programs. Also the book will be useful to Chinese students as a guide to American universities, more helpful from being the work of a foreign observer.

The translation is by Prof. James Haughton Woods of the Harvard department of philosophy, and Prof. Emmet Russell of Nankai College, Tientsin.

The New Diamond Valve-in-Head Soot Blower

By Robert June, M.E.

SOOT, it has been stated, is the best heat insulator known, being more than five times as effective as asbestos in preventing heat transference. Those who have to deal with the soot problem continuously, know that this statement is literally true. You can no more expect efficiency out of a boiler, the fire surfaces of which are coated with soot, than you can expect efficiency from a man with a bad cold. There is a congestion and bad circulation in both cases. If you want to keep up steam when the soot piles up on the boiler tubes, you will have to pile in more fuel.

Soot as found in steam boilers varies considerably in appearance and composition, depending upon the grade of coal burned, conditions of combustion, and part of the furnace from which the sample is taken. Nearest the fire the deposits formed consist largely of ash. Analysis of samples of soot, taken from a boiler, shows in addition to the "pure soot" the presence of silica, alumina, iron oxide, various alkalies and sulphur dioxide.

In all but the coolest portion of the setting, soot is usually gritty in texture. The grains may be as large as medium size sand, or as fine as cigar ash. These particles are in a plastic state when they leave the furnace, and striking the boiler they adhere to the tubes. If this deposit is not removed frequently it quickly increases in amount and changes in character. The carbon burns out in part and the mass cements together. The repeated reduction in heat-absorbing surface increases the temperature of the flue gases so that the process of cementation is continuous and constantly increasing in intensity. An extremely hard, clinker-like formation results. In a short time the tubes in some portions of the boiler are thickly coated, thus materially reducing its capacity.

The Five Essentials in Preventing Soot Waste

The five essentials in preventing heat waste caused by soot are:

(1) Frequency of cleaning in order to minimize the cumulative effects of increasing deposits. Tubes should be cleaned three or four times in 24 hours.

(2) Thoroughness of cleaning, in order to maintain high furnace and boiler efficiency, and prevent the corrosive effects of soot accumulation.

(3) Availability of system. The soot blower system should be instantly available, automatic in action, capable of being operated for an exact pre-determined period of time.

(4) Durability of system: The blower units should be so designed and constructed that they will withstand the stress of hard service without the necessity of frequent repair or replacement.

(5) Economy in Operation: The soot removing system should be cheaper in operation than hand blowing; it should be so installed as to prevent the entrance of cold air into the furnace during its operation, it should not interfere with the operation of the boilers, it should pay for itself from an investment standpoint.

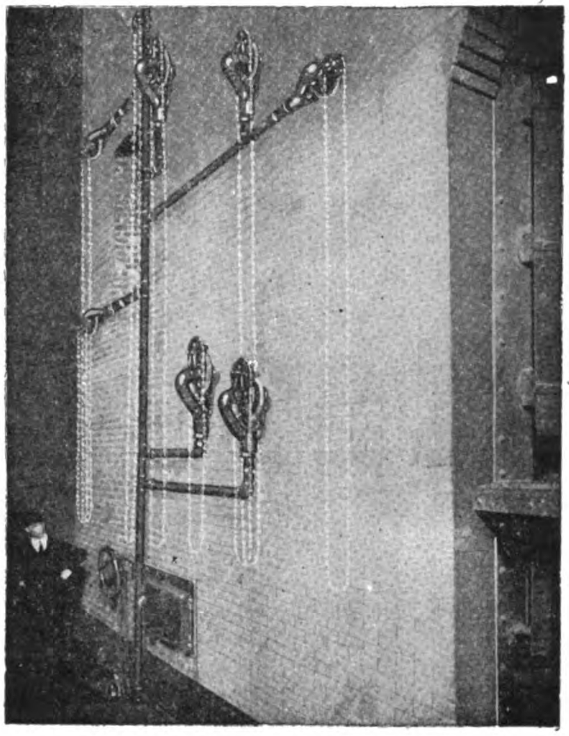


Fig. 1.

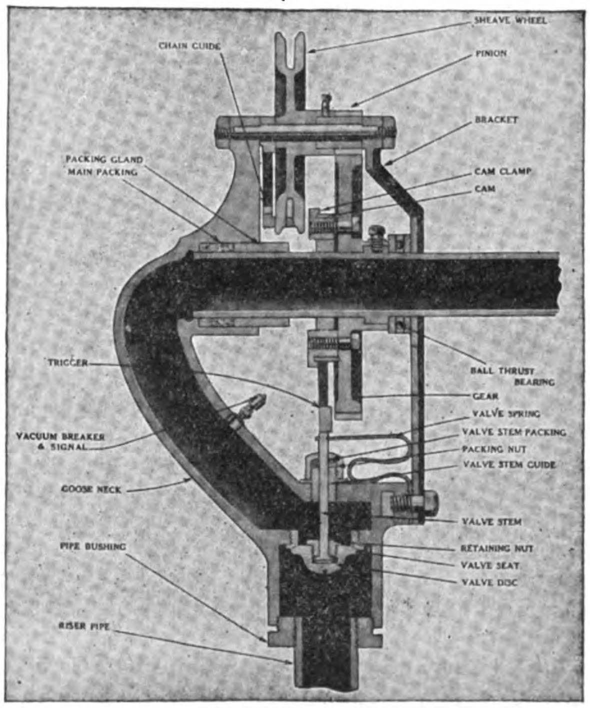


Fig. 2.

The New Diamond Valve-in-Head Soot Blower

To meet the exacting requirements noted above, an entirely new principle has been introduced in soot blower design. The valve controlling the individual unit has been incorporated as an integral part of the head. This valve (Monel metal) is of the poppet type and is placed at the base of the gooseneck. This valve takes the place of the globe valve which has always heretofore been installed (at a distance of two to fifteen feet or more from the head) in the riser pipe leading from the main header.

The special valve just referred to is located at the point marked "A" in the illustration (Fig. 1). The unit is operated in the following manner: The main control and drain valves, which are the only independent valves on the soot blower line, having first been opened, and all piping drained and heated, dry steam fills the line to the entrance of the individual valve at the base of the gooseneck "A." The sheave wheel "B" (Fig. 2) is then revolved by pulling the chain. This turns a small steel cut pinion gear (not visible in the illustration). The small pinion engages the large gear "C" which is fixedly mounted on the blower element. As the gear is revolved it operates the cam "D" which causes the lever "E" to press down the valve stem "F," causing the valve to open at a pre-determined point in the revolution. After the gear has been further rotated, the cam "D" releases the lever "E" allowing the steam pressure to close the valve at a second pre-determined point in the revolution.

As the steam leaves the line the spring " C " holds the valve closed.

Construction of Valve

The valve is made with Monel metal disc and seat. Both the stem and its retaining nut are made of nickel steel. In order to secure extra hardness, which insures durability, the end of the stem is heat treated. A special feature is the provision of a guide on the seat which permits leaving the stem loose in the disc so that the valve will always seat properly. The entire construction is such that the troubles common to globe valves, such as " wire-drawing," leaking, etc., are almost entirely eliminated. Disc and seat are readily accessible so that they may be removed easily for re-grinding or renewal, should occasion ever require.

As the tendency toward high pressure and superheat is very marked in modern power plant design, the Diamond Power Specialty Corporation makes a special steel body Valve-in-Head soot blower for such boilers as require this type of equipment.

Advantages of this Type of Soot Blower

The advantage of the Valve-in-Head soot blower as compared to soot blowers of the independent valve type, fall into two general groups.

Direct Economic Advantages.

1. Labor—a saving of approximately 50 per cent.
2. Steam—a saving of 30 to 50 per cent. or more.
3. Pipe, Valves and Fittings—a saving of 50 to 66 per cent. in cost of pipe, valves and fittings.
4. Maintenance—a reduction in annual charges of 25 to 50 per cent. or more. Practically complete elimination of condensate obtained.
5. Efficenicy—greater cleanliness of boiler assured.

Indirect Economic Advantages.

The following advantages, while primarily of a mechanical nature, have an important dollars and cents value :—

6. Interchangeability—especially adapated to replace other blower heads.
7. One Model Standard—head is made in one size for all boilers.
8. Control—Steam may be intermittently discharged over two or more arcs in revolution. Arc or arcs of steam jets within boiler invariably cover exact pre-determined limits. Speed at which blower element may be revolved is so controlled by reduction gearing as to make improper operation extremely unlikely. Unit provided with visible and audible signal to indicate valve open.
9. One Direction Operation—revolution is always clockwise ; hence blower element cannot work loose from head either partially or entirely.
10. Ease of operation—gearing and ball thrust bearings overcome friction.
11. Valve Design—time of opening and closing exactly adjusted to soot blower operating conditions, being slower than the standard quick-opening valve, and faster than the standard globe valve, thus solving a problem of long standing. Quick-opening valves have the advantage of causing a sharp thrust of the unit, due to rapid admission of the steam. With globe valves, the tortuous passages cause marked reduction in effective pressure. There are also losses of time and steam, from the slow opening and closing—losses which seem of small amount as respects a single operation, but which become important when spread over a period of time and a number of boilers.
12. Practical elimination of the possibility of water entering the portion of the soot blower inside the boiler.

It has been demonstrated repeatedly by practical experience in the largest power plants in America that Diamond Valve-in-Head soot blowers will effect such important economies as—a saving of 4 to 8 per cent. in fuel—an increase in over-all efficiency of 3 to 4 per cent.—a decrease in consumption of steam required for cleaning, and—a marked saving in labor and labor turnover.

Diamond Soot Blowers

Diamond Power Specialty Corporation, Detroit, Michigan, U. S. A. are the exclusive manufacturers of Diamond soot blowers in the United States, having purchased as of March 1st, 1922, the entire plant and the good will of the Diamond Power Specialty Company, a co-partnership, the members of which retire from the soot blower business in the Western Hemisphere.

Diamond soot blowers as made by the Diamond Power Specialty Corporation are the original Diamond soot blowers which have been produced in Detroit for the past twenty years. These Diamond soot blowers are adapted to all types of high pressure steam boilers for both marine and land power plants. Saving in fuel, labor and steam is effected by their use and boiler efficiency and capacity are increased.

The Asahi Petroleum Company

THE Asahi Petroleum Company, Ltd. has absorbed the Imperial Petroleum Company and recently paid a 15 per cent. dividend, which has been in operation for four years and a half. The merger is intended to control the petroleum market in Japan.

Among the oil wells owned by the Asahi Petroleum Company is the Akita well which had so large a flow at first that the company was unable to take care of it. The opinion of experienced engineers and petroleum specialists is that the supply of this well is almost unlimited. Besides this, the company owns other wells with very promising futures.

From December 1st, 1921, to May 31st, 1922, the company made a gross profit of Y.471,637 and excluding amounts set aside for redemption of fixed capital, net profit amounted to Y.391,637, and a dividend at the rate of 17 per cent. per annum was paid for the term. It is said that the methods of calculation of this company are in accordance with the most approved systems, and that if they had ambitions to pay higher dividends, 20 per cent. would have been quite possible by changing the method of accounting.

The main officers of the company are well known as expert oil men. The president is Mr. Kojiro Matsukata, head of the Kawasaki Dockyard Company. Managing director, Mr. Inojo Seshima, was former president of the company, and Mr. Oka was formerly managing director of the Imperial Petroleum Company. The other officers are: Directors: M. Naruse, M. Yotsumoto, H. Minagawa, K. Nagatome, K. Fujita and R. Miyao ; Manager : E. Inoue ; Auditors : R. Iwatate, S. Okamoto and E. Nagasaki.

The head office of the company is at No. 1, Itchome, Yurakucho, Kojimachi-ku, Tokyo.

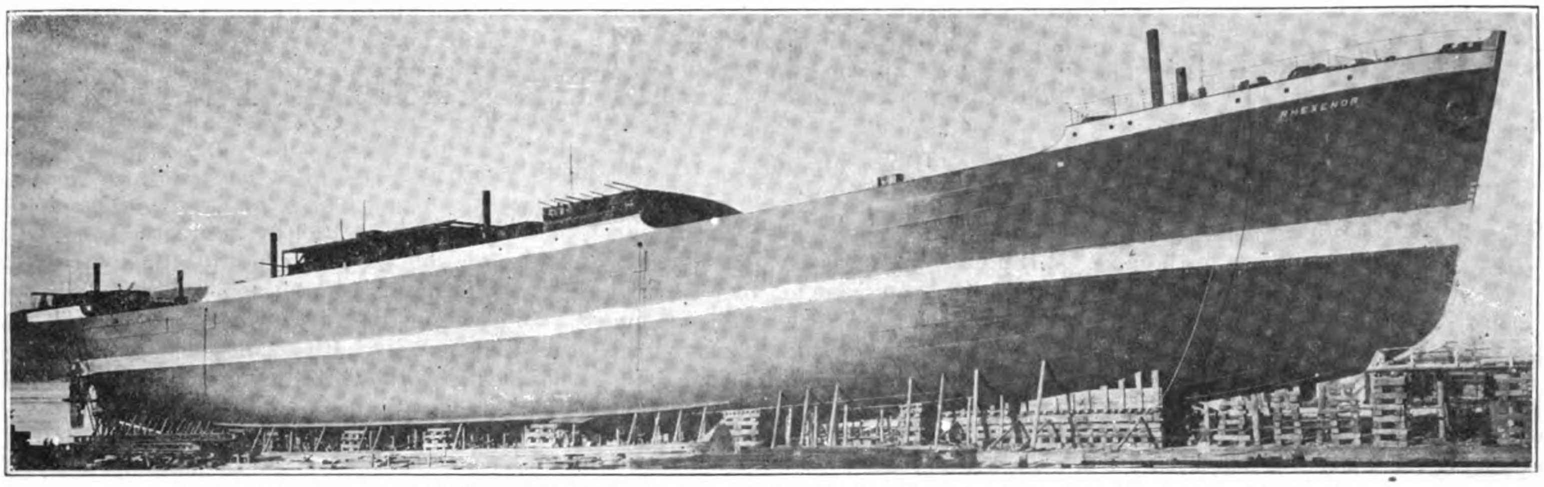
Daido Electric Transmits Power 160 Miles

ON July 1st, the transmission equipment of the Daido Denryoku K.K., from its power plant on the Kiso River to Osaka city, was experimentally opened. A total of 77,000 volts was successfully transmitted, with results better than the company had expected. On the twenty-first, 22,000 kilowatts were supplied to the Osaka Dento K.K., Keihan Dentetsu K.K., and the Kyoto Dento K.K.

The equipment of the Osaka transformer station is of the latest type for regulating current transmitted over long distances. At the end of August the 12,500-kilowatt coal-burning power plant at Keima will be completed. This power will be used for reserve, so that when water is low in winter the company will have sufficient power for all its needs.

Three power plants of this company will be completed as follows :

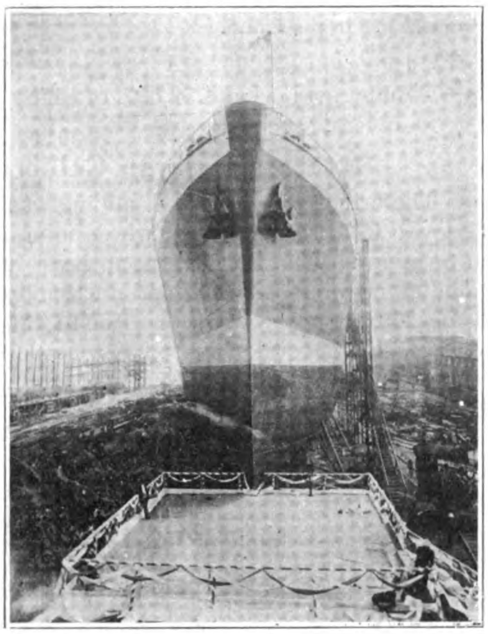
(1) Dokusho Power Plant, capacity 40,700 kilowatts. To be completed, August, 1923.
(2) Momoyama Power Plant, capacity 23,700 kilowatts. To be completed, October, 1923.
(3) Oi Power Plant, dam type, 42,900 kilowatts. To be completed, March, 1924.



The s.s. " Rhexenor," a 10,000-ton freighter built at the Taikoo Dockyard at Hongkong for Messrs. Alfred Holt & Co.

A "Blue Funnel" Launching at Hongkong

ANOTHER addition to the "Blue Funnel" fleet of Messrs. Alfred Holt & Co. was successfully launched at the Taikoo Dockyard in Hongkong on June 29th. The naming ceremony was performed by Mr. C. W. Beckwith. The principal dimensions of the vessel are: Length over-all 477-ft. 6-in., breadth over-all 58-ft. 4-in. and 35-ft. 3-in. depth to upper deck from bottom of keel, the total gross tonnage being 8,040, and deadweight carrying capacity will be about 10,000 tons. The *Rhexenor* has two complete decks with an orlop deck forward, poop, bridge and forecastle and citadel deckhouse at fore end of bridge, two pole masts and ten derrick poles, also six cargo hatches. The vessel has a raking stem, elliptical stern, and cellular double bottom all fore and aft, the wings of which have been carried well up the sides of the vessel. Eight watertight bulkheads are carried to the upper deck, giving the vessel six cargo holds. The space under the forecastle has been fitted up for emigrants, while the space under the poop has been utilized for the accommodation of sailors and firemen. Petty officers' rooms are on the bridge deck alongside the engine casing. In the citadel house at the fore end of the bridge deck, the saloon, engineers' rooms and three staterooms have been arranged, and on the deck over the saloon is a steel house containing the captain's day and night cabins, also four rooms for officers. Over this house again is the navigating bridge with wheelhouse and chart room. The vessel is supplied with eighteen steam winches with derricks carrying loads varying from 2 tons to 40 tons. A powerful Marconi wireless apparatus is installed, with suitable rooms for the operators.



Bow and Stem View of the s.s. "Rhexenor"

The machinery consists of one set of Parsons latest turbines driving through double reduction gearing and capable of developing a total shaft horse-power of 6,500. Steam is supplied to the turbines by two large double-ended boilers, one single-ended auxiliary boiler is also provided, and all the boilers have a working pressure of 220-lb.

Electric light has been fitted throughout the ship.

When completed and on service the *Rhexenor* will attain a speed of 14 knots.

Industrial Development of Hokkaido

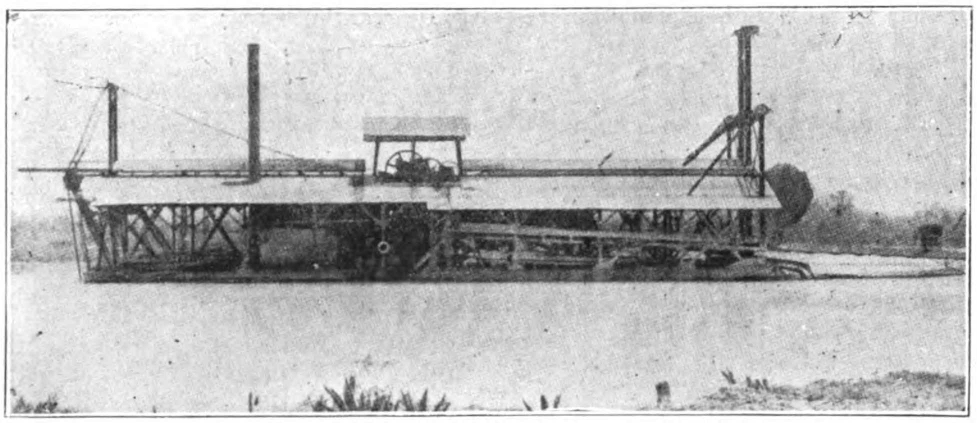
The principal industries of the Hokkaido, the most northern of the main islands of the Japanese empire, are fisheries, lumbering and paper making. The merchants of Hokkaido display a keen interest in business and give a quick interpretation to business problems.

The ports of Hakodate and Otaru afford excellent harbor facilities. All cargoes, except a few of lumber and fish, from these ports load for transhipments at Yokohama or Kobe and for that reason the cargo movement is confined to the Japanese coastwise trade. These cities have a population of more than 100,000 and afford an excellent market for the specialty trades. The city of Sapporo has, in addition to government headquarters, the Imperial Agricultural College. This college means a great deal to the future development of Hokkaido and each year there is an increased development in agricultural pursuits. The Oji Paper Co., at Tomakomai, is the largest paper company in Japan and operates a complete unit, including the cutting of timber from its own forests, the development of hydro-electric power which supplies not only its own plant and near-by villages but the cities of Sapporo and Otaru as well, and the production of its own sulphur and lime supplies.

F.M.S. Mining and Engineering Notes

62 Tin Dredges in Malaya

IN 1914, there was only one bucket dredging proposition of any magnitude in the F.M.S. In that year the Malayan Tin Dredging Co., Ltd., started with one dredge in operation one under construction and four projected. By the end of 1920 there were 30 bucket dredges in operation and with 22 proposed and under construction. Including the ten dredges working in the Siamese tin fields adjacent to the F.M.S., this makes a total of 62 dredges operating and proposed in the Malay Peninsula, a development that has taken place within the past six years. If we add to this the number of gold dredges working in the Philippines, Korea and Siberia, the Far East takes its place as one of the most promising markets for dredges in the world.



Type of Tin Mining Bucket Dredge in use in the F.M.S.

The annual report of the F. M. S. mines department for the year 1921 makes rather depressing reading in regard to tin output and prices. The following figures tell the story of how the slump has affected the tin industry of the peninsula :—

Year	Ore price. $ c.	Received by miners. $ c.	Duty $ c.
1915	54.72	45.65	6.77
1916	61.27	51.35	7.82
1917	78.29	61.30	12.56
1918	108.45	85.32	18.45
1919	86.89	71.40	12.00
1920	108.48	89.00	15.60
1921	61.20	49.72	7.68

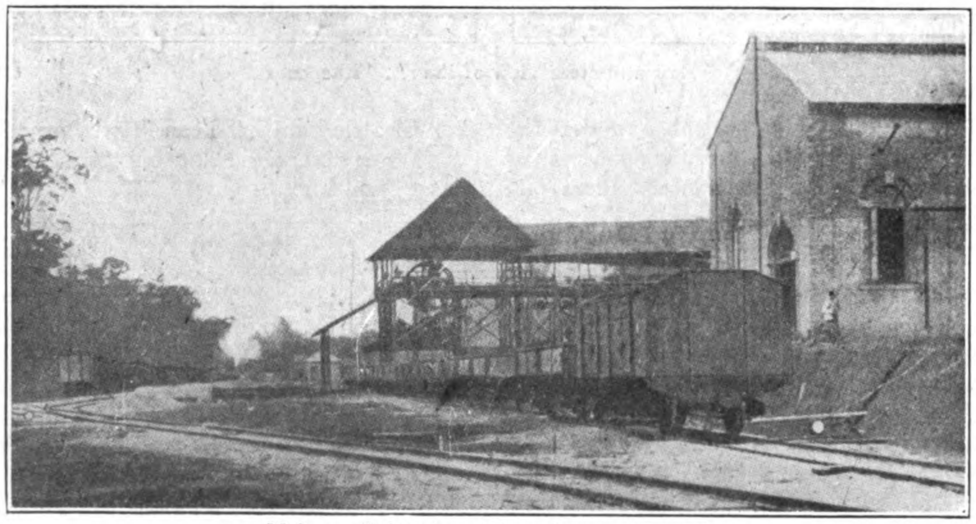
Miners received less per picul in 1921 than at any time since 1915. The report says : "The outstanding feature and chief contributing cause of the low price prevailing throughout the year has been the abnormally low consumptive demand. As no corresponding decrease in production occurred a large accumulation of stocks both in producing and consuming countries had resulted by the end of the year. Until these stocks are liquidated no permanent improvement in the price can be anticipated and any attempt to unload part of these stocks at the present juncture will, no doubt, seriously retard the recovery in the price. At the close of the year conditions in the tin plate industry, which, at the beginning of the year were very bad in America and the U. Kingdom, had improved considerably. It is assumed this improvement will continue, necessitating a stronger demand, this, combined with the better labor outlook in evidence during the latter part of the year and a revival in trade conditions generally should take the price to a higher level during the ensuing year. No very marked advance in the price, however, can be expected to eventuate until the American consumption, which was very poor during the year, again approaches the normal, and the continental demand approximates its pre-war level."

The production of tungsten ores has sunk to 55 tons while the quantity of gold placed on the market was 14,674 ounces valued at £59,097, of which, the Raub mine produced 14,430 ounces.

Malayan Collieries

The bright spot in F.M.S. mining was the coal output from the Malayan Collieries, Limited, whose mine is located at Batu Arang in Selangor. This mine seems to have fully justified the expectations of its promoters, the production for the year under review being 299,351 tons, an increase of 51,434 tons over the preceding year, making a total of 1,175,950 tons since production commenced in 1918. The principal consumer is the F.M.S. railways which took 144,934 tons, the mines 92,728 tons, other F.M.S. industries 12,874, leaving 49,263 tons which were exported.

The main seam of the Rawang coalfield contains 10,000,000 tons of marketable coal, and the area of the mine is 1,800 acres held under lease and 20,000 acres under prospecting license. The surface plant comprises a boiler house with two Babcock and Wilcox boilers with patent step-grate furnaces giving a heating surface of 2,531 square feet, to each boiler, and having an induced draught Sirocco fan, 40-in. in diameter, direct coupled to high-speed steam engine, this fan being capable of giving 2-in. draught with three boilers under full power. The feed tank capacity is 30,000 gallons. The main engine house,



Malayan Collieries at Batu Arang, Selangor

comprising the haulage engine section, has two double-drum haulage engines, with loose drums, geared 3 to 1 for fast haulage and each engine has cylinders 12-in. diameter by 24-in. stroke while the electric generator section has two 100 kilowatt sets, 500 volts direct current, compound wound, interpole dynamos, by Mather and Platt, Limited, these being direct driven by high-speed compound steam engines. The switchboard contains two generator panels, with overload and reverse current circuit breakers and equalizing switches, and one feeder panel, with four distribution switches, while the motor-generator is 500 volts to 100 volts and is for electric lighting.

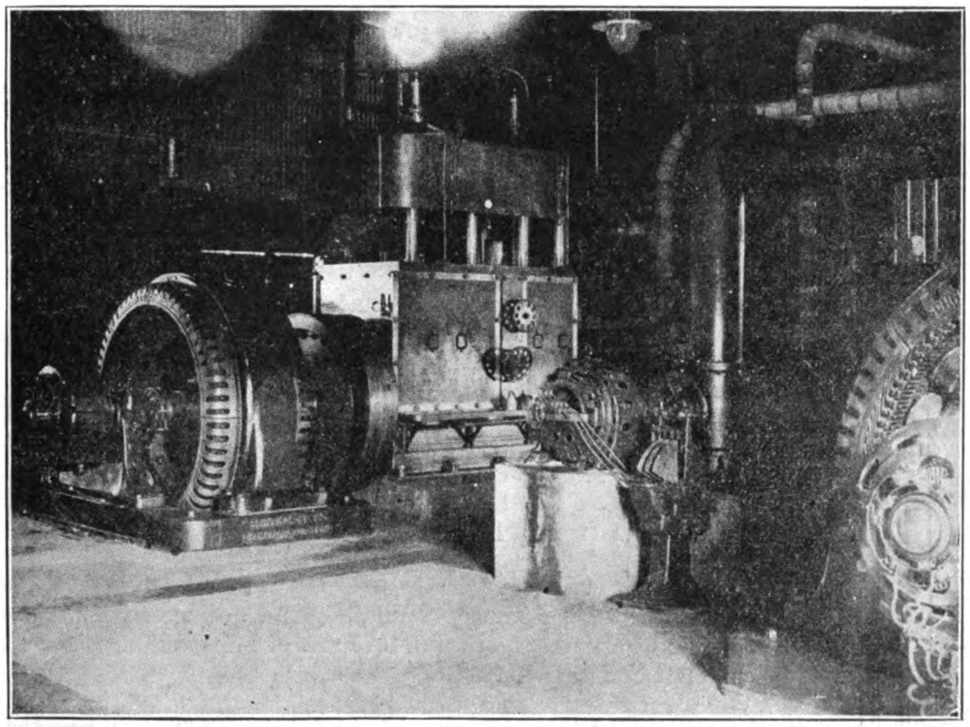
All cables carrying current to the mines, fan and shops are special tropical twincore paper-insulated, lead-covered, laid in bitumen in stoneware troughing ; but those carrying current in the mines are armoured, and suspended from the timbers.

The ventilating fan is 36-in. diameter and is of the "Turbon" mining type capable of passing 20,300 cubic feet of air at 4-in. water gauge.

The loading stage is a temporary structure of timber and the coal after being weighed is tipped on a screen which produces two sizes of coal while the mine has one-and-a-half miles of track connected with the F.M.S. railways near Batu Arang station. The sidings near the Heapstead have a grade of 1 in 90 to facilitate handling of waggons and a 60-ton weighbridge was installed by the F.M.S. railways.

The 1921 report shows that the mine operated with 1,891 horse-power and the labor force averaged about 2,700 men. The north and south mines and open-casts Nos. 5 and 6 were operating on the top seam while open-casts Nos. 1 and 2 were operating in the bottom seam. The top seam, therefore, supplied 170,956 tons or 57.11 per cent. of the output and the bottom seam 128,395 tons or 42.89 per cent. During the year 2,652-ft. of development driving and 1,500-ft. of cross-cutting were completed.

Considerable advance was made with the hydraulic stowage scheme and the practice of replacing coal won by sand stowed hydraulically is now well established. It is intended to extend the principle and with this end in view a new sand bunker was laid down at No. 6 shaft. This bunker measures 94-ft. by 21-ft. and will hold 1,000 cubic yards of sand, which quantity can, if necessary, be flushed into the underground workings in the space of four hours. A dam for storing "flushing water" has been excavated and an 8-in. electrically driven turbine pump for taking care of the flushing nozzles has been installed near by. To deal with the drainage underground from the stowage operations, a 6-in. electrically driven turbine pump has been installed in the north mine housed in a chamber 72-ft. long by 12-ft. wide and by 12-ft. high, walled and arched throughout with brick.



A Tin Mine Power Plant: Societe des Etains de Kepong. Schneider et Cie, Generators

Batu Caves Cement Works

The Batu Caves Portland Cement Works' (Selangor) operations were as follows, in tons, for the last three years :

Year.	Limestone.	Cement manufactured.
1919	6,786	4,395
1920	7,372	5,451
1921	6,048	1,768

all of which for the year under review was used locally and shows a decrease of production of 3,683 tons as compared with 1920.

Machinery and Hydraulic Appliances on Mines

The toal effective horse-power of steam, gas, oil, hydraulic and electrical plant employed on mines in the year under review is estimated at 59,200 (including Raub mine and the colliery) and is classed as follows :

State.	Steam.	Steam-electric.	Hydraulic.	Hydro-electric.	Suction gas.	Oil engines.	Oil-electric.	Total, 1921.	Total, 1920.
Perak	16,550	1,339	14,322	2,524	621	874	1,800	38,030	40,990
Selangor ...	7,034	900	1,042	...	383	176	1,200	10,743	13,145
Negri Sembilan	950	...	413	...	...	...	...	1,363	1,372
Pahang ...	4,108	...	1,687	2,022	52	195	1,000	9,064	8,853
Total, 1921 ...	28,642	2,239	17,464	4,546	1,056	1,245	4,000	59,200	64,360
„ 1920 ...	29,889	3,652	18,859	4,637	1,993	3,730	1,600	64,360	
„ 1919 ...	25,826	2,771	17,497	4,686	1,811	2,552	2,200	57,343	

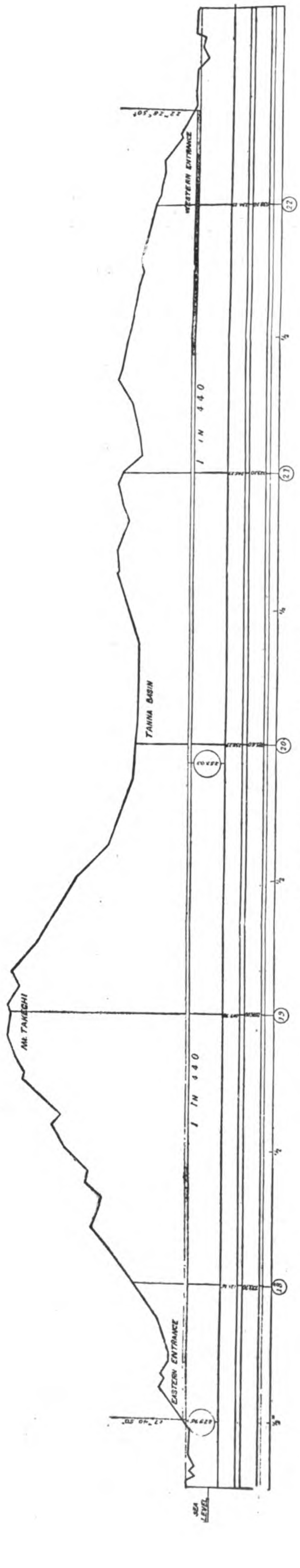
a decrease of 5,160 horse-power as compared with the previous year.

Steam and Other Plants

The increase in the use of machinery in the F.M.S. is seen in the number of plants under inspection. The total horse-power of plant installed and registered under the machinery enactment is 136,459 (inclusive of hydro-turbines aggregating 3,460 h.p.), of which, 83,125 h.p. was in employment. The number of boilers registered and under inspection totals 2,053 with a collective h.p. of 90,291. The horse-power of steam plant in employment in the year aggregated 46,182 and that of unemployed 44,109. There were 997 oil engines with an aggregate h.p. of 25,335 and 313 gas engines with a total of 17,087 h.p. Five hundred and forty-seven installations of machinery were inspected during the year, a decrease of 21 installations as compared with 1920.

Electrical Installations

For generating purposes at the end of 1921, there were 101 installations with a total of 11,983 kilowatts distributed as follows: Perak, 65 installations, 7,097 k.w. ; Selangor, 27 with 1,789 k.w. ; Negri Sembilan, 6 with 79 k.w. ; and Pahang 3 with 3,018 k.w. The distribution of electrical supply shows that over 90 per cent. (11,316 k.w.) was employed in the mining industry, 338 k.w. in agriculture, 264 k.w. in general use and 65 k.w. by the government. The classification of all electrical generating plant employed in the F.M.S. shows that 11,509 k.w. are used for power and 3,215 k.w. for lighting, of which capacity, 11,000 k.w. of power are used by the mining industry alone. The total horse-power of motors connected was 12,659.



Profile of the Atami Tunnel Cutting

The Atami Tunnel

By H. C. Huggins

THE greatest engineering work now under construction by the Imperial Japanese Railways is the Tanna tunnel (more commonly known as the Atami tunnel), a preliminary to the electrification of the Tokaido line operating between Tokyo and Kobe, cut through one of the most volcanic regions of Japan. When completed, it will save seven miles of track on the main line of the Tokaido and eliminate the tedious haul over the Hakone mountains between Kozu and Numadzu.

The peculiar nature of the soil in which excavations must be made demanded a most careful survey by the greatest geologists in Japan. The first survey was completed in 1915 by Dr. Matajiro Yokoyama, professor of the department of science in the Imperial University of Tokyo, who reported as follows : " The Tanna basin is the crater of an extinct volcano. The bottom of the crater was once a lake, the water having drained off through some outlet to the west. It is difficult to ascertain the thickness of the strata of mud at the bottom, of the crater, but as the deepest well in the neighborhood is only 33-ft. deep, it is possible to conclude that the mud ceases at that depth, and that beneath it lies a strata of congealed lava.

In November 1915, Dr. Satoshi Suzuki, a noted geologist, also submitted a report on the geology of the district, somewhat in contradiction to that of Dr. Yokoyama, but substantiating his opinion that it was safe to construct a tunnel through the district, if it were excavated at not less than 500-ft. below the bottom of the extinct crater.

On the basis of these reports, the engineers of the railway bureau made their plans, and in March, 1918, construction work was begun with an appropriation of Y.53,000,000 by the imperial diet. Since then the work has continued without interruption, except for minor difficulties, as when the tunnel caved in last year burying some tens of workmen, many of whom were saved by the bravery of their gang boss.

The eastern entrance of the tunnel is at Atami-machi, Shizuoka prefecture, and the western entrance at Kanna-mura, Tagata-gun, Shizuoka prefecture, passing through the Hakone mountains, a distance of 4 miles and 68 chains, from entrance to entrance. The railway line will be double track, completely electrified. The width of the tunnel is 28-ft., height 22-ft. 6-in., area 544 square feet. It is built in the midst of old volcano craters, and many times work has had to be abandoned for a time, because of the breaking out of hot springs, geysers, etc.

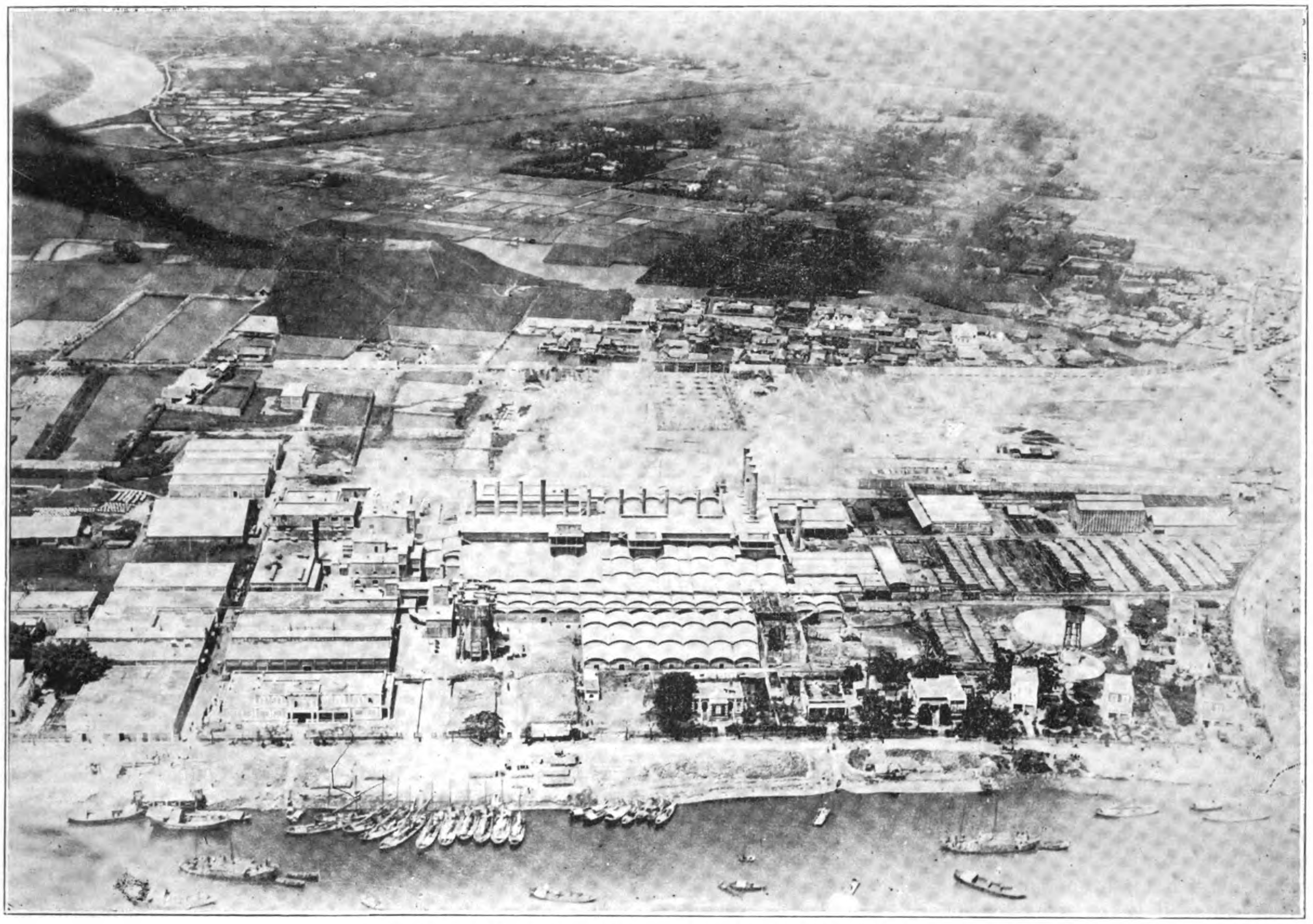
The transport of building materials, and removal of the excavated material is done by means of a light gauge railway (2-ft. 6-in.). A part of the railway is electrically operated, but in that part nearest the excavations the cars are pushed by hand. Air is supplied by ventilating equipment, which transmits 5,000 cubic feet of air a minute into the interior of the tunnel. A partial change of air is also effected by the exhaust from the compressed air of the rock drills.

All machinery used in construction is electrically operated. At the western entrance there is a coal-burning power plant equipped with four steam engines of the "Taguma" type, with a capacity of 1,600 h.p., and also a Parsons turbo-generator 3-phase, 2,200 volts, 2,500 kilowatts, 50 cycle. This plant transmits all the power used in operations, and supplies electric lights for both entrances of the tunnel, and for the outside as well.

At the east entrance 350 workmen are engaged, and at the west entrance 450. On July 1, 1922, at the east entrance (Atami) 4,468-ft. of excavation had been completed and the surface had been leveled for track construction for a distance of 2,218-ft. On the wall of the tunnel 1,968-ft. of concrete work, and 1,881-ft. of brick arch wall had been finished.

At the west entrance (Kanna), 4,940-ft. of excavation, 4,210-ft. of sm[illegible]lling, 3,993-ft of concrete work and 3,700-ft. of brick and artificial stone work ha[illegible] also been completed on July 1, 1922.

When the tunnel is completed in March 1926, it will be the most important link in the great plan for the complete electrification of the main line of the Imperial Government Railways.



Aeroplane View of the Haiphong Cement Works in Indo-China

The Haiphong Cement Works

THE SOCIETE DES CIMENTS PORTLAND ARTIFICIELS DE L'INDO-CHINE was founded in 1899 and the first stone of the works laid down the 25th of December of the same year.

The raw materials necessary for the fabrication of cement are found plentifully in the vicinity of the plant at Haiphong; these materials had been studied very carefully and, only after numerous analyses, the society purchased the important deposits containing the best limestone in the country, more particularly the deposits of the "Ile des Deux-Songs" in the province of Quang-Yen.

The preparation of the materials is carried out by the dry process; the clay drawn out from the bed of the Cua-Cam River is completely dried, then mixed in suitable proportions with the limestone crushed by means of powerful crushers; the whole is then very finely ground, so as to obtain an impalpable powder, the composition of which is rigorously constant.

The [illegible]er compressed into bricks is burnt in fifteen vertical kilns [illegible] improved system so as to enable the plant to produce a cement perfectly homogeneous. The burnt cement is ground again in powder and the finished product is packed in bags or barrels.

The driving power necessary for the whole plant was originally about 1,200 h.p. This first group was soon increased by two turbo-alternators of 1,200 h.p. each, constructed by the "Société Alsacienne de Constructions Mécaniques" at Belfort. The building for the turbo-alternators was erected in prevision of a third one of 3,000 h.p., actually in course of installation, and necessitated by the important extensions now being carried out.

The grinding of the raw materials and of the cement was originally done by means of nine groups of preliminary crushers and tube-mills; later five other grinding works were installed including two compound-crushers and three "Centaure" crushers, each of which is directly driven by an electric motor; these "Centaure" crushers are of the most powerful type; they allow obtaining easily a cement of a very great fineness, an essential quality of Portland cement.

Several chemists constantly working in the laboratory of the factory supervise all phases of manufacture.

The cement sold by the plant at Haiphong is equal in quality to the French and European brands of world-wide reputation. The results of the tests effected in the various official laboratories show that the cement possesses a very high compressive as well as tensile strength. The constancy of volume being absolute proves a quite thorough mixing of all elements.

The cement of Haiphong meets the requirements of all specifications and contracts; it is particularly suitable for all works requiring a product of high-grade quality such as reinforced concrete structures, flagging, etc.

The board of public works in Indo-China has used a very large quantity of Haiphong cement specially for the construction

of the railways of Tonkin, Cochin-China and Yunnan; this board having permanently a surveyor at the factory, it can be said that the manufacture is done under its control. Many tests have been made by this board.

The artillery board also uses Haiphong cement for its construction work.

Buildings of reinforced concrete of great magnitude have been erected with the cement of Haiphong, among which dams and landing-wharfs for the coal-mines of Tonkin at Hongay; the market-halls of Saigon, the sheds of which have an 84-ft. span without intermediate supports; numerous bridges at Bangkok; the Royal Palace at Bangkok remarkable by a consolidation of reinforced concrete; storagebins for limestone and clay supporting on the top two bruising mills of the greatest size, the whole construction with the raw materials contained weighing 1,080 tons is supported by 16 columns of reinforced concrete of 14-in. diameter.

The good behavior of the cement of Haiphong in sea water has been equally shown by numerous and conclusive experiments carried out by the laboratory of the board of public works.

The Haiphong Cement Works not only send their products all over Indo-China, but they ship considerable quantities into other countries, China, Philippines, Siam, Netherlands India, Singapore, etc.

The present production capacity is 150,000 tons. This will be shortly doubled by a new factory, now in course of building, furnished with the most up-to-date equipment, more particularly six compound-crushers "Centaure" and eight kilns P.C. with automatic discharge and large output, of the most improved type. It is therefore one of the most important industries of Indo-China and of the whole Far East; after carrying through all the new instalments, the factory will take place among the most important cement works in the world.

A workshop provided with the most perfect equipment for manufacturing barrels is attached to the plant, the timber of the country is used for it, as it was found quite appropriate for this purpose. Owing to the necessary enlargement required by this workshop, it will be rebuilt to include saw-mill and cooperage, fitted transforming into barrels more than six hundred logs of timber a day.

The board of this important society is composed as follows: Messrs. E. Candlot (Président) and R. Ferrant (Membres du Comité de Direction), Ch. Candlot, F. Lebreton, L. Marchegay, N. Perpignani and R. Thion de la Chaume and as general secretary, Mr. Ch. Thomonn, ingénieur des arts et manufactures.

The general direction was assumed, in the beginning, by Mr. N. Perpignani, and afterwards, during more than twenty years, by the late Mr. J. Barriere; the actual general manager is Mr. G. Chenu, ingénieur E.P.C.

The Société des Ciments de l'Indo-Chine obtained a "Grand Prix" at the exhibition of Hanoi in 1903; a "Grand Prix" at the exhibition of Marseilles in 1906, at the exhibition of Liège in 1904 the society was hors concours, membre du jury.

Unfair Competition Forbidden by Law

WRITING in the *Dodge Idea*, Mr. Ralph J. Butz defines the law on unfair competition and answers some questions which apply to every line of business where an established name is used by a competitor in confusing the public. Mr. Butz says:

"Unfair methods of competition have been the cause of many cases in the courts, and during the last ten years especially, various state and federal laws have been enacted for the protection of the business man who suffers as a result of unfair methods practiced by his competitors. Federal and state authorities are also, as far as is practicable, lending their assistance to overcome this evil.

"The methods practiced by competitors of this class are, of course, as many and varied as their ingenuity can devise. However, one of the most common methods resorted to, is the use of the trade name and private brand of a successful firm, and to leave the purchaser under the impression that he is getting the article which is well known and favorably regarded. This deception is practiced by marking the goods with the mark by which they have always been known to the trade, or placing by them in containers similar to the ones used by the firm whose reputation for the goods has been established.

"When such deception is practiced by a competitor, confusion is likely to result, and it will undoubtedly work to the injury of the firm whose trade name and private brands have become favorably known to the public through years of satisfactory and successful service.

"On this point the law has been stated very plainly in the following manner: 'A dealer, coming into a field already occupied by a rival of established reputation, must do nothing which will necessarily create or increase confusion between his goods or business and the goods or business of his rival.'

"Also, 'Irrespective of the question of trademark, a manufacturer has no right to inclose his product in packages so like those of a rival manufacturer as to deceive a purchaser, or to enable a dealer to do so.'

"The principle prohibiting unfair trade methods applies to every line of trade. Every man in business has a perfect right to carry on spirited competition with other business men, and the law cannot by any means be construed as opposing competition. It is only when one business man's false pretenses tend to mislead customers and to work harm to a rival that the law will interfere. And this interference by the law is entirely justifiable for when a business man or firm has spent years in development of its trade, then they should be protected against the wanton misuse of trade names and private brands which have become known to the public only through the expenditure of much energy and advertising.

"In another case where a defendant used unfair methods against an established rival, the court said: 'The test is whether the label or mark is calculated to deceive the public, and lead them to suppose they are purchasing an article manufactured by a person other than the one offering it for sale. It may be stated broadly that any conduct, the natural and probable tendency and effect of which is to deceive the public, so as to pass off the goods of one person as that of another, constitutes actionable unfair competition.'"

Even the Lumber Men Protest

IN a very exhaustive survey of the export lumber trade of the Pacific Northwest written by Frank Foster for the *West Coast Lumberman*, he nails the lies that were circulated about the use the Japanese were making of the large imports of cedar from Pacific coast ports.

"A particularly active form of propaganda being carried on by them just now is that of stirring up ill-feeling against those nations with whom it is all-important that we should have a good understanding. Among the criminal and potentially criminal classes that form the larger part of their readers there is a dim idea that the abuse of other nations is evidence of patriotism toward one's own. Now trading with foreign nations is based very largely on mutual confidence; and the propaganda carried on by certain newspapers in this country against the Japanese is distinctly hostile to our trade with Japan. The dense ignorance of the matter in hand that is sometimes displayed in these acrimonious comments is hardly complimentary to the intellect of the reader; but it seems to be good enough for them or it would hardly continue.

"On one occasion a warning note was sounded concerning the immense quantity of cedar (eleven million feet or more) which had been shipped to Japan from this coast, ostensibly for the manufacture of lead pencils, but really for the construction of bomb-carrying airplanes to devastate our coast cities. It must be admitted that eleven million feet of suitable lumber would build some fleet of airplanes; say about thirty thousand. But red cedar is a brittle wood, and the wood for airplanes must be of the toughest and most elastic. Some of us remember the difficulty there was in getting even spruce of the requisite grade for the purpose. Moreover, the vibration of an airplane presents some exceptional difficulties to be overcome in its construction. Red cedar has a rather exceptional feature itself; it is so susceptible to vibration as to be unsuitable for the temporary ties used on logging roads because the vibration of the rails will loosen the spikes. It has no "holding" quality. Imagine such a wood used in the construction of an airplane! Yet the readers of this alarmist literature apparently accepted the statement as an incontestable fact."

Sir W. G. Armstrong Whitworth & Co.

Sir W. G. Armstrong Whitworth & Co., Ltd., well-known shipbuilding and armament manufacturers of Newcastle-on-Tyne, are the latest British engineering contractors to interest themselves in the possibilities of China as an outlet for their varied and comprehensive products, and an office has been opened in Peking which will be under the direction of Mr. R. A. S. Waters, their resident representative in China.

This firm is in a position to undertake contracts for the construction and equipment of harbor works, docks, railways, canals, bridges, etc., and many of the largest schemes in the world have been carried out by its civil engineering department.

Messrs. Reiss & Co. have been appointed their sole agents for the whole of China and Hongkong.

To Feel at Home in America

When your American trip is all planned, and you are getting ready to leave, that's the time to make hotel reservations.

The Statler-operated hotels, in five of America's principal cities, pay especial attention to a helpful, comprehensive service to travelers from overseas, and you can find no better, or more comfortable, hotels anywhere in the world.

To make reservations is very easy. Any office of Messrs. Thos. Cook & Son will be glad to attend to it for you; or you can write direct to the Statler Hotel which you will visit first—whether in New York, or one of the Western cities. That hotel will give you an introduction to the others of the group, make reservations for you in the other cities, and be of service in many ways.

World-travelers from everywhere make the Statler hotels and the Statler-operated Hotel Pennsylvania, New York, their homes when they are in these cities.

ST. LOUIS — Hotel Statler
CLEVELAND—Hotel Statler
DETROIT — Hotel Statler
BUFFALO — Hotel Statler
NEW YORK — Hotel Pennsylvania

Hotels Statler

In all these hotels (which are under one management) every room has private bath and many other unusual conveniences. Especial attention is paid to travelers from overseas, and you can be sure that you are getting the best there is, at prices no higher than in other hotels of the first class.

Hotel Pennsylvania is the largest hotel in the world—2200 rooms, 2200 baths.

Hotel Pennsylvania

NIPPON MENKWA
KABUSHIKI KAISHA

(THE JAPAN COTTON TRADING CO., LTD.)

LARGEST IMPORTERS AND EXPORTERS
IN THE FAR EAST

COTTON
COTTON YARN
COTTON PIECE GOODS
RAW SILK
WOOL
GENERAL COMMISSION MERCHANTS

Established 1892

HEAD OFFICE: No. 10 2-Chome, Nakanoshima, OSAKA, JAPAN
SHANGHAI OFFICE: 8 Hankow Road
TIENTSIN OFFICE: 42 Rue de France, French Concession

Capital Subscribed-	Yen 50,000,000.00
Capital paid-up	Yen 20,250,000.00
Reserve Funds	Yen 26,825,000.00

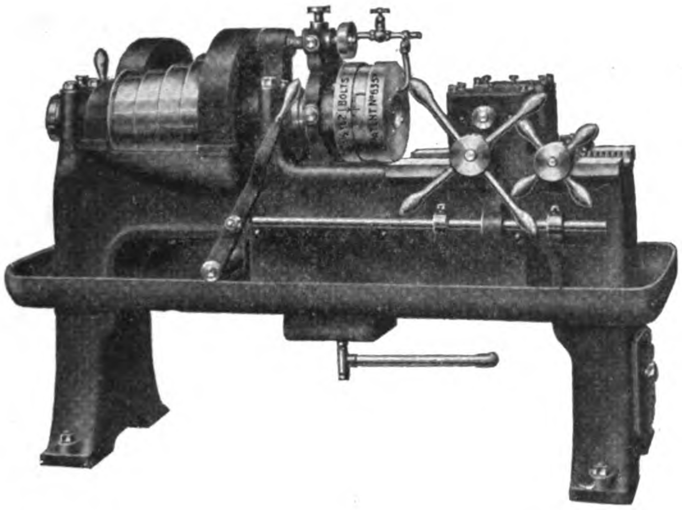
MATAZO KITA, Esq., *President*
ATUSHI YAMADA, Esq., *Vice-President*

Directors :

K. SUYEYOSHI, Esq. G. IMAMURA, Esq. R. NAKAMURA, Esq.
H. OHOKA, Esq. T. SHIKATA, Esq. K. KUSUMOTO, Esq.
T. YASUI, Esq.

BRANCHES: Semba (Local), Dairen, Shanghai, Hankow and Bombay
AGENCIES: Kobe, Yokohama, Tokyo, Seito, Tientsin, Newchwang, Tiehling, Changchung, Harbin, Hongkong, Calcutta, Karachi, Rangoon, Alexandria, Liverpool, New York and Buenos Aires
SOLE BUYING AGENCY IN U.S.A.: Japan Cotton Trading Company of Texas, Fort Worth, Texas
SOLE BUYING AGENCY IN COREA: Corea Cotton Trading Company, Limited
FACTORIES: Cotton Press at Hankow, Cotton Gins and Presses in India

Heap's Patent Screwing Machines



are made in all sizes, and suitable for dealing with all classes of work.

The illustration opposite shows our 2in. Patent Automatic Bolt Screwing Machine which is one of a complete line of Single and Multiple Head Machines specially designed for use wherever large quantities of Bolts have to be dealt with in the most expeditious and economical manner.

We will gladly advise you as to the most suitable machine for your particular class of work.

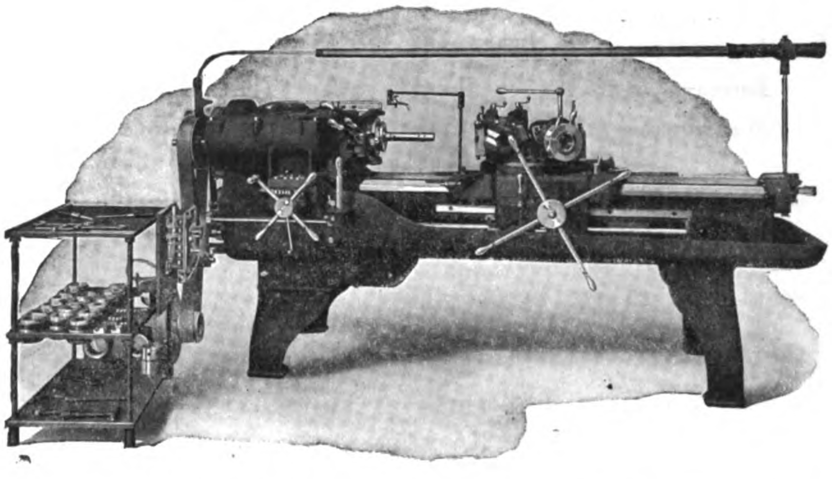
Catalogue free on request.

JOSHUA HEAP & CO., LTD.,

ASHTON-UNDER-LYNE, ENGLAND.

A SPECIAL MACHINE FOR GENERAL WORK

Take a Hartness Flat Turret Lathe, **equipped for bar work** like that shown here. Set the turning, cutting-off, threading and other tools of the standard equipment for the **diameters and shoulder lengths** of the piece you wish to make. **And then—Presto!** You have a special machine for that piece. The machine will turn out piece after piece with an accuracy limited by the **wear of the cutting edges only,** and at speeds and feeds that are exactly right for each individual cut. And that is more than some complicated and special machines can do.



On chucking work it is the same, except that **the simple, flexible and effective equipment** of the Flat Turret Lathe shows up **to even better advantage.**

You may have a small shop, or a big one. In either case the Hartness Turret Lathe is the **most efficient machine for a large percentage of your lathe work.**

Catalogue and descriptive literature sent post free on request.

JONES & LAMSON MACHINE COMPANY.

9-10 Water Lane, London, E.C., England. **Springfield, Vermont, U.S.A.**

Cable Address: "Turretorum" London **Cable Address: "Turret" Springfield, Vt.**

THE BANK OF CHOSEN

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor: S. Minobe, Esq.
Deputy-Governor: T. Kano, Esq.

Directors:

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT: TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY:

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE:

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL AND SURPLUS - - - - - U.S. $10,000,000
UNDIVIDED PROFITS - - - - - 5,400,000
RESERVE FOR DIVIDENDS - - - - 600,000

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK

LONDON OFFICE: 36 BISHOPSGATE, E.C.

LYONS OFFICE: 27 PLACE TOLOZAN

SAN FRANCISCO OFFICE: 232 MONTGOMERY STREET

BRANCHES:

CHINA
- SHANGHAI
- PEKING
- TIENTSIN
- HANKOW
- HARBIN
- HONGKONG
- CANTON

DOMINICA
- SANTO DOMINGO
- SANCHEZ
- SAN FRANCISCO
- SAN PEDRO
- SANTIAGO
- PUERTO PLATA
- BARAHONA
- LA VEGA

INDIA
- BOMBAY
- CALCUTTA
- RANGOON

JAPAN
- YOKOHAMA
- KOBE

JAVA
- BATAVIA
- SOURABAYA

PANAMA
- PANAMA
- COLON

PHILIPPINES
- MANILA
- CEBU

SPAIN
- BARCELONA
- MADRID

STRAITS SETTLE-MENTS
- SINGAPORE

We are also able to offer our Customers the services of the Branches of the National City Bank of New York in the principal countries of South America, Central America and in the West Indies.

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current Accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

H. C. GULLAND, *Manager.*

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital ... ... **Frs. 72,000,000**
Reserves ... ... **„ 70,000,000**

HEAD OFFICE: 15 BIS RUE LAFFITTE, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Nouméa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

JUGO GINKO, LIMITED

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugo Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-up Y. 49,750,000 Reserve Funds Y. 23,900,000

***President*: The Hon. Iwao Matsukata *Vice-President*: Masayasu Naruse, Esq.**

***Managing Directors*: Yutsuha Sato, Esq. and Kanesato Aiko, Esq.**

***Head Office Manager*: Sei Usagawa, Esq.**

***Head Office*: No. 6, 7chome, Kobiki-cho, Kyobashiku, Tokyo.**

BRANCHES:

SHIMBASHI, MARUNOUCHI, GOFUKUBASHI, TOHORISANCHOME, KAKIGARACHO, NINGYOCHO, RYOGOKU, FUKAGAWA, KANDA (TOKYO). OSAKA, SENBA, TAMATSUKURI, NISHI, KUJO, MINAMI, NAMBA, TENNOJI, KITA, TENGACHAYA (OSAKA), KOBE, SAKAEMACHI, FUKIAI, HYOGO (KOBE). KYOTO, NAGOYA, SAKAI, WAKAYAMA, NISHINOMIYA, OKAYAMA, HIROSHIMA, SHIMONOSEKI, FUKUOKA, KUMAMOTO, KAGOSHIMA, SENDAI.

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD. LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD.
UNION DISCOUNT CO. OF LONDON, LTD.

THE

BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - - -	Yen 60,000,000
Capital Paid-up - - - - - - -	„ 45,000,000
Reserve Funds - - - - - - -	„ 9,680,000

President: KOJURO NAKAGAWA, Esq. Vice-President: SHUNROKURO MORI, Esq.

DIRECTORS:

TSUNEKICHI IKEDA, Esq.
GUNJI KAWASAKI, Esq.
TADASU HISAMUNE, Esq.
KUMEMATSU MORINAGA, Esq.
MASUMI ESAKI, Esq.

Head Office: TAIPEH, FORMOSA (TAIWAN)

BRANCHES:

JAPAN: Tokio (General Affairs Department), Kobe, Moji, Osaka, Yokohama.
TAIWAN: Keelung, Tainan, Takow, and 11 other points.
CHINA: Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

AGENTS AND CORRESPONDENTS:

In the Principal Cities and Towns throughout the World.

LONDON BANKERS:

BARCLAYS BANK, LTD. LLOYD'S BANK, LTD. LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.

TOKYO BRANCH:

No. 1, Eiraku-cho Ni-chome, Kojimachi-ku.

Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

---

CAPITAL SUBSCRIBED - - - - - -	**Yen 50,000,000**
CAPITAL PAID-UP - - - - - - -	**Yen 45,000,000**

HEAD OFFICE:

MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:

TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:

NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
KINICHI KAWAKAMI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

THE SUMITOMO GOSHI-KAISHA

OSAKA, JAPAN

OWNERS OF BESSHI COPPER MINE, COAL MINES, SILVER AND GOLD MINES, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper, Brass, Bronze and other Alloys, Solid and Drawn Steel Tubes, Nails, Etc.—Superphosphate and Composite, Manure, Sulphuric and Nitric Acid, etc.

GENERAL WAREHOUSE AND BANKING BUSINESS

WORKS AND DEPARTMENTS

Warehouses ... ... Osaka, Kobe & Tokyo
Mining Offices ... ... Besshi, Wakamatsu, Sapporo & Ohgayu
WORKS:
Copper Works ... ... Osaka & Amagasaki
Fertilizer Works ... ... Niihama
Sales Departments ... ... Osaka, Kobe, Tokyo, Kure, Yokosuka, Hakata, Shanghai, Hankow and Tientsin

THE SUMITOMO STEEL WORKS, LTD.

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of Every Description for Railways, Shipbuilding Yards, Mines, Hydraulic Electric and Other Engineering Works, etc., etc.

THE SUMITOMO ELECTRIC WIRE & CABLE WORKS, LIMITED

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Copper, Brass, Bronze and Nickel Wires and Strips, Trolley Wires, Insulated Wires and Cables of Every Description for Telephone, Telegraph, Lighting, Power Transmission, etc., etc.

THE SUMITOMO BANK, LIMITED

Head Office: OSAKA, JAPAN
Cable Address: "SUMITBANK"
President: Baron K. SUMITOMO
Established March, 1912
(Successors to The SUMITOMO BANK)

Capital Subscribed	**Yen 70,000,000**	**Reserve Fund ... ...**	**Yen 22,500,000**
Capital Paid-up	**„ 50,000,000**	**Deposits ... ...**	**„ 369,000,000**

Head Office: Kitahama, Osaka
City Offices: Semba, Bingomachi, Nakanoshima, Dotonbori, Kawaguchi, Tenma, Nipponbashi.
Home Branches: Tokyo (Tokyo, Toriaburacho, Fukagawa, Shinbashi, Asakusa), Yokohama, Nagoya, Kyoto (Kyoto and Nishijin), Kobe (Kobe and Hyogo), Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Wakamatsu, Kokura, Hakata and Kurume.

Foreign Branches: Shanghai, Hankow, Bombay, London, New York and San Francisco.

Agents: The Sumitomo Bank of Hawaii, Ltd., Honolulu, Lloyds Bank, Ltd., London, National City Bank of New York, New York.

Correspondents: In all important places at home and abroad.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

CHAIRMAN:

Mr. Manzo Kushida

MANAGING DIRECTORS:

Mr. Mikitaro Kikuchi Mr. Kiyoshi Sejimo
Mr. Takeo Kato

HEAD OFFICE:

No. 3 Yayesucho Nichome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

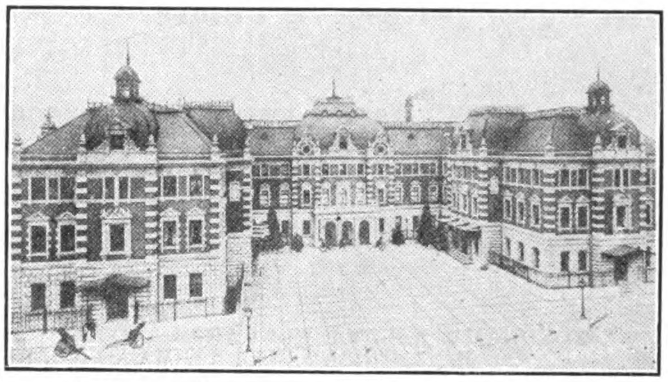
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Semba (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for the Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed... ....Y. 100,000,000.00
Capital Paid-Up.....................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

NIHONBASHI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.
New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.
Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.
Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital - - -	**Yen 50,000,000.00**
Paid-Up Capital - - - -	**Yen 36,350,000.00**
Reserve Fund - - - -	**Yen 33,500,000.00**

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:

No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.

T. AKASHI, *Manager*

CITY BRANCHES:

ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:

YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:

SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:

The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE ONE HUNDREDTH BANK, LTD.

(DAI HYAKU GINKO)

HEAD OFFICE, AWOMONO-CHO, TOKYO

TOKYO BRANCHES: No. 1 Torihatagocho, Nihonbashi: No. 10, Ginza Nichome, Kyobashi
YOKOHAMA BRANCH: Nos. 53-55 Honcho Shichome
OSAKA BRANCH: 28 Bingo-machi, Nichome
KYOTO BRANCH: Shijo Higashinotoin
SHINMACHI BRANCH: Shinmachi Dori Sanchome

President: K. IKEDA, Esq.

Managing Director: S. CHOH, Esq.

SUBSCRIBED CAPITAL - - - -	Yen 25,000,000
CAPITAL PAID-UP - - - - -	Yen 17,500,000
RESERVE FUND - - - - -	Yen 8,094,340
DEPOSITS - - - - - - - -	Yen 110,740,264

Transacts General Banking and Foreign Exchange Business. Conducts Trust Company Business

Hongkong and Shanghai Banking Corporation

Paid-up Capital	... ...	$20,000,000
Reserve Funds: Sterling	... ...	£4,500,000
Silver	... ...	$23,500,000
Reserve Liability of Proprietors	... ...	$20,000,000

Court of Directors:

G. M. DODWELL, Esq., Chairman

Hon. Mr. A. O. LANG, Deputy Chairman

D. G. M. BERNARD, Esq.
G. T. M. EDKINS, Esq.
P. H. HOLYOAK, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
A. M. BOWES SMITH, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY	LONDON
BANGKOK	LYONS
BATAVIA	MALACCA
BOMBAY	MANILA
CALCUTTA	NAGASAKI
CANTON	NEW YORK
CHEFOO	PEKING
COLOMBO	PENANG
DAIREN	RANGOON
FOOCHOW	SAIGON
HAIPHONG	S. FRANCISCO
HAMBURG	SHANGHAI
HANKOW	SINGAPORE
HARBIN	SOURABAYA
ILOILO	SUNGEI PATANI
IPOH	TIENTSIN
JOHORE	TSINGTAO
KOBE	VLADIVOSTOCK
KUALA LUMPUR	YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

THE ROYAL BANK OF CANADA

HEAD OFFICE, MONTREAL.

LONDON, ENG. — PRINCES ST., E.C.
NEW YORK. — 68, WILLIAM ST.
PARIS, FRANCE. — THE ROYAL BANK OF CANADA (FRANCE)
BARCELONA. — PLAZA DE CATALUNA 6

702 BRANCHES.

594 BRANCHES IN CANADA AND NEWFOUNDLAND, ALSO

108 FOREIGN BRANCHES.

ARGENTINA Buenos Aires (2 Branches).
BRAZIL Rio de Janeiro, Santos. Sao Paulo.
URUGUAY Montevideo.
VENEZUELA Caracas, Ciudad Bolivar. Maracaibo.
COLOMBIA Barranquilla.
COSTA RICA San José.

WEST INDIES

CUBA—Havana (9 Branches), Antilla, Banes, Bayamo, Caibarien, Camaguey, Camajuani, Cardenas, Ciego de Avila, Cienfuegos, Cruces, Cueto, Florida, Guantanamo, Jatibonico, Manzanillo, Matanzas, Moron, Nuevitas, Palma Soriano, Pinar del Rio, Puerto Padre, Sagua la Grande, Sancti Spiritus, Santa Clara, Santiago de Cuba, and at twenty other points.
PORTO RICO—San Juan, Mayaguez & Ponce. **HAITI**—Port-au-Prince, etc.
DOMINICAN REPUBLIC—Santo Domingo, La Romana, Puerto Plata, Sanchez, San Pedro de Macoris and Santiago de los Caballeros.
MARTINIQUE—Fort de France.
GUADELOUPE—Pointe-à-Pitre and Basse Terre.
BRITISH WEST INDIES—Antigua, Bahamas, Barbados, Dominica, Grenada, Jamaica, Montserrat, Nevis, St. Kitts, St. Lucia, Trinidad and Tobago.
BRITISH GUIANA—Georgetown, New Amsterdam, etc.
BRITISH HONDURAS—Belize.

CAPITAL PAID UP AND RESERVES ... $41,000,000 GOLD
TOTAL RESOURCES ... ... $470,000,000 GOLD

The First National Bank of Boston

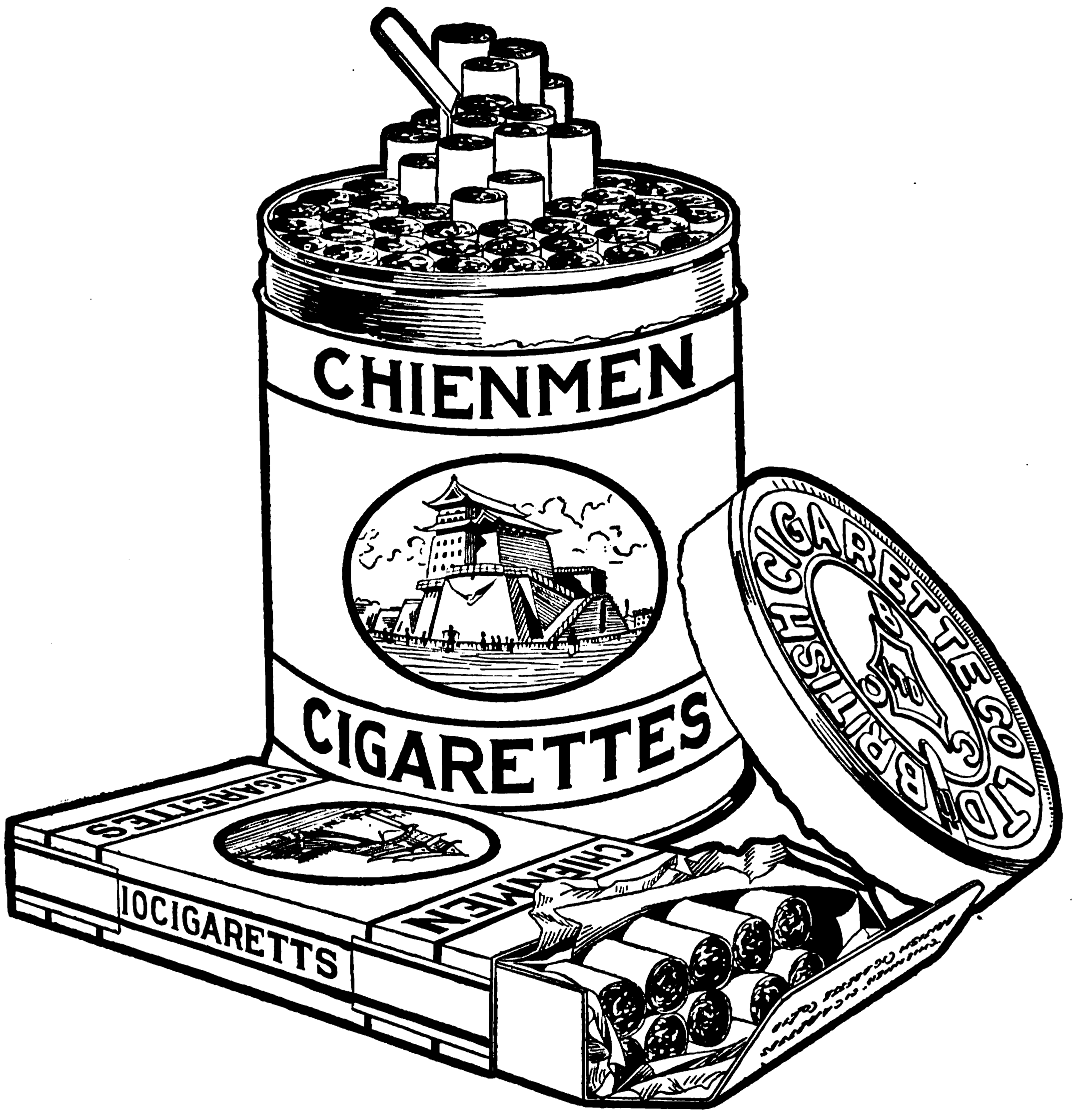
The leading financial institution of New England

Foreign and domestic commercial banking of every nature.

Correspondence solicited.

CHIENMEN

Cigarettes



A brand well known to the "High Grade Cigarette Smoking Public" of China.

BRITISH-AMERICAN TOBACCO CO. (CHINA), LTD.

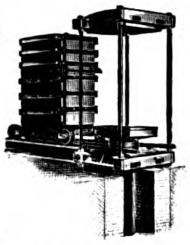
Distributors

Tel. Address: "OMO" | **Codes:** A.B.C. 4th & 5th Edition | **Established** 1810

To Exporters and Manufacturers

who require

Hydraulic Presses



Hydraulic Packing Press, for Cotton Waste, etc.

for packing goods of every description, for Home and Foreign transport.

May we have your enquiries?

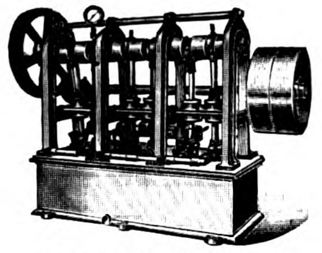
We make Presses and Pumps for Hand, Steam, and Electric Power.

EDWIN MILLS & SON LTD.

Wakefield Road,

Aspley,

HUDDERSFIELD.



6 Throw Belt Driver Pump

Hydraulic Leathers, Pipes and Fittings always in stock.

DIAMOND
POWER SPECIALTY CORPORATION

Exclusive Manufacturers in the United States of

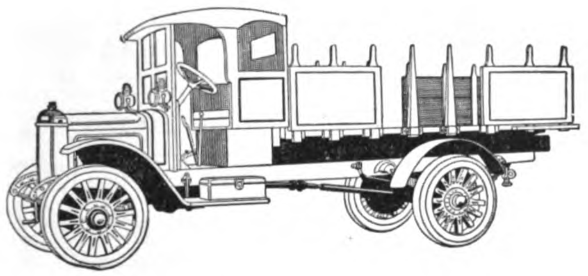
DIAMOND
SOOT BLOWERS

For all high-pressure steam boilers.

10340 Oakland Avenue,
DETROIT, MICHIGAN, U.S.A.

UNEQUALLED SERVICE TO THE USER.

REPUBLIC



Built to stand the rough and constant service to which a satisfactory commercial vehicle must submit Republic Trucks by their rugged construction and high power-efficiency deliver unfailing haulage at the minimum cost per ton-mile.

Whatever be the usage to which your vehicles are put, there is a type of Republic Truck that will meet your requirements.

Central Garage Co., Ltd.,
9 Hongkong Road,
Shanghai

REPUBLIC TRUCK SALES CORPORATION,
Alma, Michigan, U.S.A.
Cable Address : REPUBLIC

SOUTH MANCHURIA RAILWAY

MANCHURIA AND CHOSEN LINES

Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul and Dairen and Changchun), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least twice a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

SOUTH MANCHURIA RAILWAY COMPANY

Head Office: DAIREN

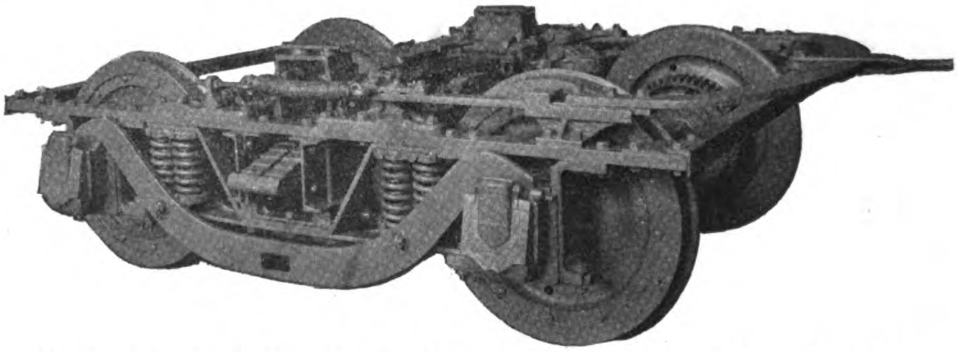
Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

Telegraphic Address: MANTETSU or SMRCO. Codes: A.B.C. 5th & 6th Editions, A1 Lieber's, and Bentley's

BALDWIN

Improved Motor Trucks

meet the most severe conditions of high-speed electric interurban and street railway service



Baldwin Type A Truck used on the Osaka Electric Railway, and also on the Osaka Tetsudo Railway. Similar trucks are also used on American and foreign railways.

Baldwin Electric Motor trucks are designed and built with the same engineering skill and excellence of workmanship as our locomotives.

Among the notable features which have made these trucks most desirable in various parts of the world may be mentioned the following:—

Weight consistent with strength.
Accurately built—lowest possible rolling resistance.
Minimum current consumption.
High efficiency in service.
Easy to inspect and repair.
Perfect riding qualities.
No unnecessary tilting or rocking.
Axles of unusual strength.
Self-lubricating, dust-proof Journal boxes.
Simplest and best brake design.
Highest quality materials.
Built for centre pin loads from 20,000 to 60,000 pounds.
May be designed for any gauge track.

For Simplicity, Strength and Perfect Riding Qualities, Baldwin Trucks Cannot be Excelled

Detailed information upon request

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U.S.A. **Cable Address : "Baldwin, Philadelphia"**

SALE & FRAZAR, LTD., Tokyo and New York
J. O. FEENSTRA, Bandoeng, Java, D. E. I.
C. BREWER & CO., LTD., Honolulu, Hawaii
NEWELL & CO., Melbourne, Victoria
ANDERSEN, MEYER & CO., LTD., Shanghai and New York
PHILLIPS & PIKE, Wellington, New Zealand
R. TOWNS & CO., Sydney, New South Wales
LESLIE & CO., Perth, Western Australia
PACIFIC COMMERCIAL CO., Manila, P. I., and New York
J. W. KELER, Harbin, Manchuria

705

MOTOR TRUCKS

JAPANESE
GOVERNMENT
RAILWAYS

THOROUGHLY EQUIPPED LINES REACH EVERY PLEASURE RESORT AND BUSINESS POINT

Reserved Cars, Private Cars, Special Trains on Previous Arrangement for Tourists' Parties of all Sizes

WELL-FURNISHED PASSENGER CARS WITH SLEEPING AND DINING ACCOMMODATION ON THROUGH TRAINS AND EXPRESSES

TWO MOST RELIABLE ORGANIZATIONS FOR TRAVELLERS

1. JAPAN TOURIST BUREAU
   Peking Office: Morrison Road, Peking
   Head Office: Tokyo Station, Tokyo, Japan
2. JAPAN HOTEL ASSOCIATION
   c/o Traffic Bureau, Japanese Government Railways

For Particulars, Time-Tables, Guide Books, etc., please apply to
TRAFFIC BUREAU, DEPARTMENT OF RAILWAYS, TOKYO, JAPAN

JAPANESE GOVERNMENT RAILWAYS

THROUGH BOOKING TO AND FROM

CHINA

Single and Return Tickets between China and Japan via Chosen

Period of Validity: Single, 40 days: Return, 110 days. 20% Reduction for Return Tickets

China-Japan Party Trip Tickets

Period of Validity: Two months. Reduction: 25%-50% for 10 or more passengers

China-Japan Circular Tour Tickets

Period of Validity: Four months. Reduction: 30% for Railway; 25% for Steamer

China-Japan Parcel Through Traffic

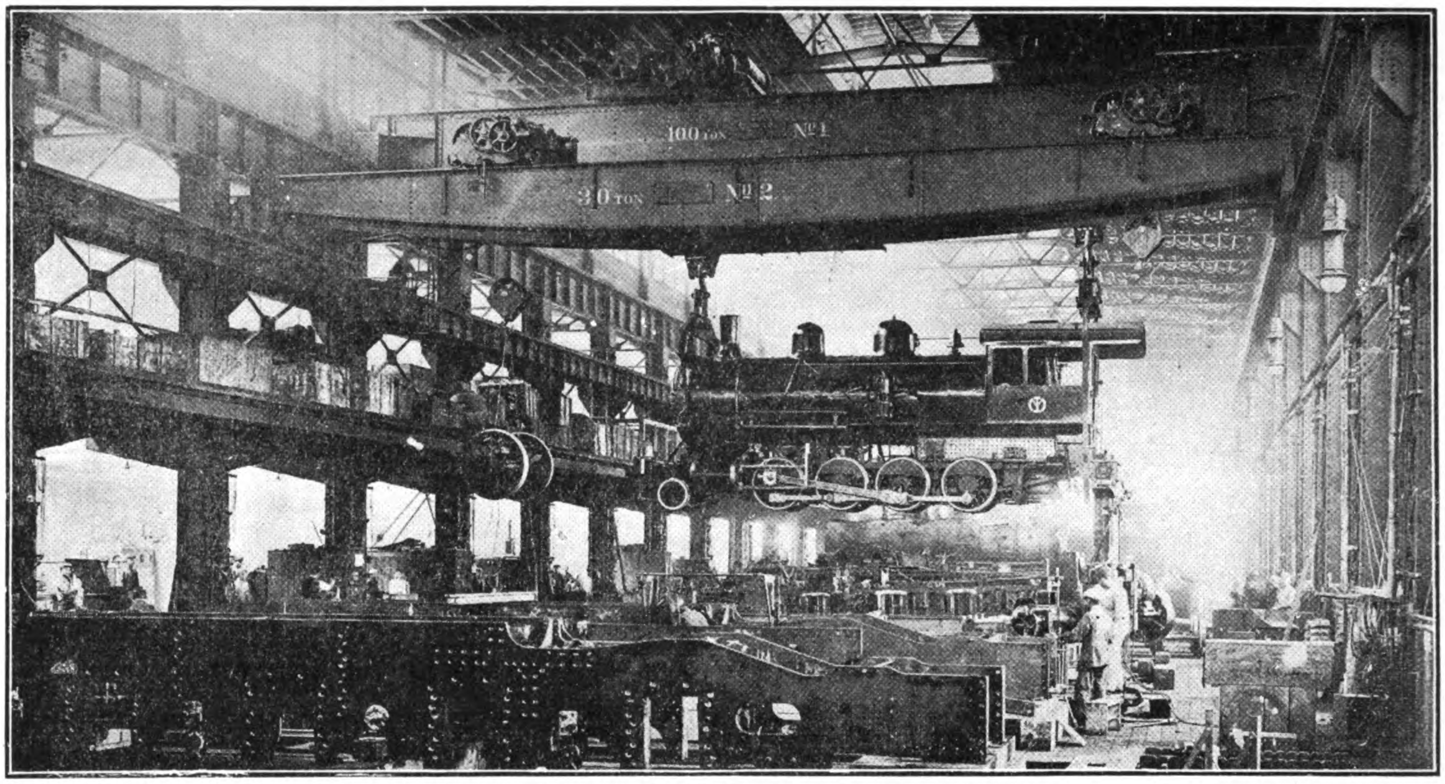
Parcel through conveyance between the principal stations in China and Japan viâ Chosen at low rates

OFFICIAL GUIDE TO EASTERN ASIA

1st Vol.	Manchuria and Chosen	Y. 7.00	Sold at Kelly & Walsh (Yokohama, Shanghai)
2nd „	S.W. Japan	Y. 5.00	„ Maruzen (Tokyo)
3rd „	N.E. Japan	Y. 5.00	„ Offices of Japan Tourist Bureau (Tokyo, Kobe, Peking, etc., etc.)
4th „	China (Proper)	Y. 7.00	„ G. P. Putnam's Sons Co. (New York)
5th „	East Indies	Y. 5.00	„ The Philippine Educational Co. (Manila)

SOUTH MANCHURIA RAILWAY

SHAKAKO RAILWAY WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

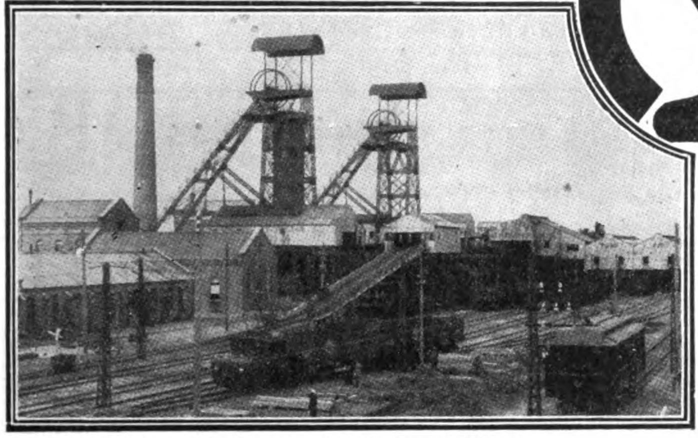
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

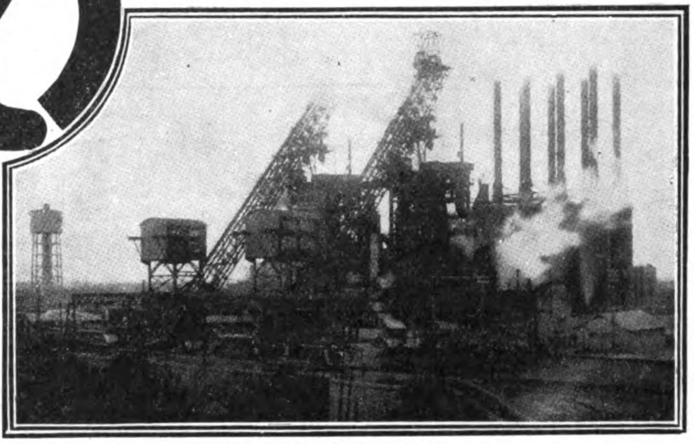
THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON



Togo Pit of the S.M.R. Fushun Collieries



Anshan Steel Works of the S.M.R.

FUSHUN COAL

The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

Depots:

Dairen, Port Arthur, Newchwang (Yingkou), Tientsin, Tsingtao

Agencies:

Chefoo, Takao (Formosa), Osaka, Manila, Nagoya, Hongkong, Batavia, Shanghai, Sourabaya, Yokohama, Moji, Singapore, South Seas, Saigon, Penang, Niigata, etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day) Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day) Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

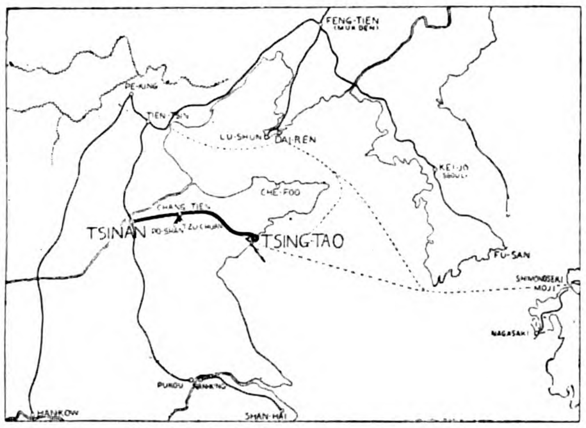
A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

BUT THE TWAIN HAS MET AND BLENDED HERE

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.

For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.

Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway. At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.

The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1 leaves Tsingtao daily 10.00 p.m. arrives Tsinan 8.00 a.m.
Train No. 3 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.40 p.m.
Train No. 2 leaves Tsinan daily 11.00 p.m. arrives Tsingtao 8.35 a.m.
Train No. 4 leaves Tsinan daily 10.10 a.m. arrives Tsingtao 8.20 p.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30 ; 2nd class, $7.20.

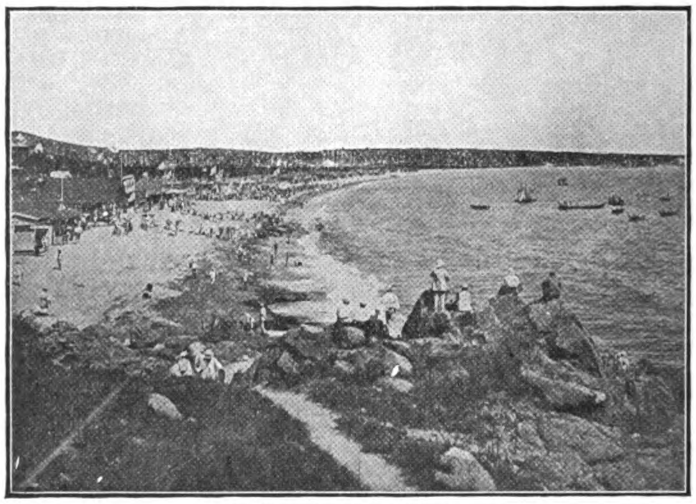
First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.



BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

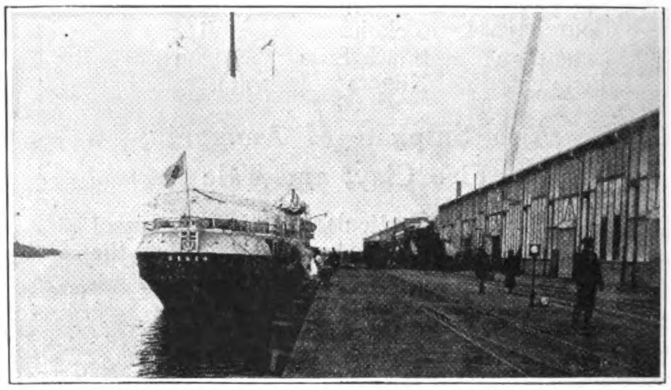
The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.



THE GREAT HARBOUR, TSINGTAO

For Further Information, please apply to

THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

"BON ACCORD"

CENTRIFUGAL PUMPS

FOR ALL PURPOSES

DRIVEN BY STEAM, ELECTRICAL, GAS, OIL, OR BELT POWER.

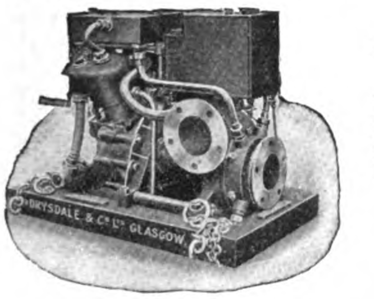


Illustration shews a 4" Portable Petrol Driven Pump easily carried by two men. Capacity 90 tons water P. Hr. Specially arranged for dealing with muddy water.

FOR MARINE SALVAGE CONTRACTORS, IRRIGATION, FLOOD DRAINAGE, ETC., ETC.

DRYSDALE & CO., Ltd., Yoker, Glasgow

Tel. Address: Bonaccord, Glasgow

PITTSBURGH STEEL CO.

Pittsburgh, Pennsylvania, U.S.A.

Manufacturers of "PITTSBURGH PERFECT"

OPEN HEARTH STEEL PRODUCTS

INCLUDING

Galvanized Wire	Bolt and Rivet Wire
Bright Hard Wire	Galvanized Barbed Wire
Bright Nail Wire	Wire Nails
Annealed Wire	Fence Staples
Bright Soft Wire	

Pig-Iron, Blooms, Billets, Wire Rods, Hard Spring Coil Wire, Twisted Cable Wire, Bale Ties, Steel Hoops, Steel Bands, Cotton Ties and Fabricated Stock, Poultry and Lawn Fencing.

We are prepared to give PROMPT SERVICE, and solicit your inquiries accompanied by complete specifications.

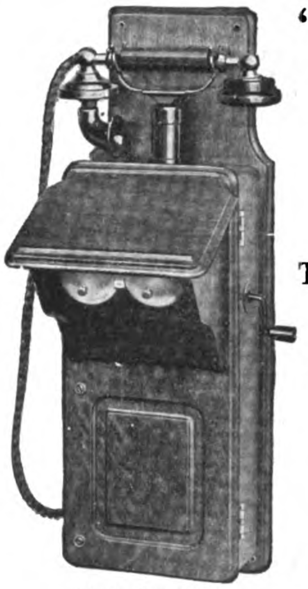
ADDRESS:

PITTSBURGH STEEL CO.

EXPORT DEPARTMENT:

EQUITABLE BUILDING, NEW YORK, U. S. A.

Cable Address: "PITTSTEEL."



Code No. 5020
Magneto Telephone

"USE IS THE TEST"

MANUFACTURERS
of
High Grade
TELEPHONE APPARATUS

Plans and Specifications
furnished for
Complete Telephone
SYSTEMS.

Village, City and Long
Distance Service

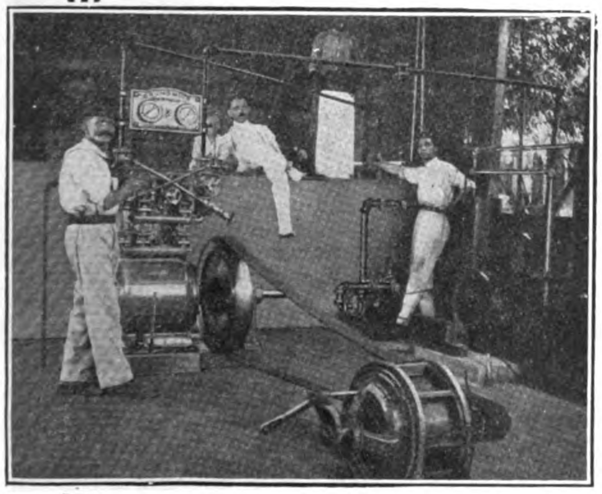
KELLOGG SWITCHBOARD & SUPPLY CO.

Head Office & Factory,
Chicago, U.S.A.

Tel. Add.
"SWITCHBOARD"

Far Eastern Branch
No. 62 Kiangse Rd.
SHANGHAI.

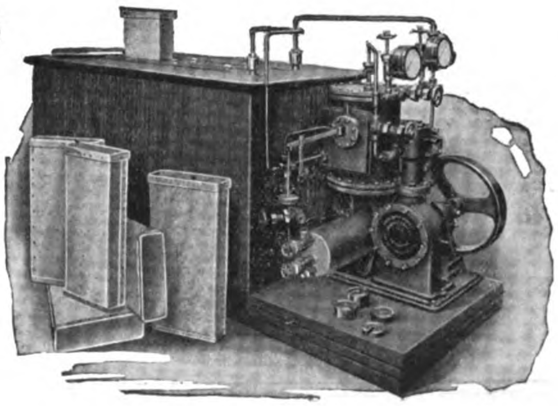
Brunswick Refrigeration



We show here a *Brunswick* installation in the ice-making plant of Juan B. del Giudice of San Pedro de Macoris, D. R. The cut illustrates clearly both the simplicity and efficiency of the *Brunswick* equipment, its rugged construction and its ease of operation. This machine was installed in 1914, has been in constant operation ever since and has given such satisfaction that a second similar machine has lately been installed. Attention is directed to the perfection of the cake of ice just drawn from the can.

Brunswick refrigerating and ice-making machinery is adaptable to numerous industries,—markets, dairies, meat and produce-preserving plants, bottling establishments, cold storage, etc. These dependable machines can give refrigeration and produce ice at one and the same time. Blue prints and detailed instructions for installation and operation furnished with each plant.

BRUNSWICK



We particularly call attention to our standard portable ice-making plant, shown opposite. This little equipment produces 250-lb. of ice daily. It is shipped complete and ready to make ice as soon as charged with ammonia and connected to power and water supply. We also manufacture ice-making machines varying in capacities up to six tons daily.

Brunswick-Kroeschell Company

Dept. 2, New Brunswick, N.J., U.S.A.

DIXON'S GRAPHITE WATER-PROOF GREASE

This heavy-bodied mixture of Dixon's flake graphite in pure mineral grease is splendidly adapted to pump plungers, elevator plungers, gears, and all class of machinery exposed to water or weather. It cannot be washed off by hot or cold water and is an absolute rust preventive.

Dixon's Graphite Wire Rope Grease

For lubricating and preserving wire rope and cable this grease has no superior. It is water-proof and weather-proof—coats the metal strands throughout with a rust-preventing layer of pure graphite—penetrates throughout the cable, giving both internal and external lubrication. For winches, hoists, pile drivers, dredges, elevators, this Dixon's Grease is supreme.

Samples of any Dixon's Graphite Grease will be sent free, on request, with "Grease Booklet," No 94-K.

These handy little sticks—so easy to hold against a belt while it's running—contain a fine assortment of belt food, predigested and ready for the belt to assimilate.

As you rub this dressing on your belts, you'll see them grow soft and pliable, you'll see the hard, glassy surface give place to the dull, clinging surface that takes hold of the pulley and drags it along.

Many a belt has been scrapped that could have been saved with Dixon's Solid Belt Dressing.

Proof? Send for Booklet No. 94-0

"The Proper Care of Belts."

Made in Jersey City, N.J., by the

Joseph Dixon Crucible Co.

Established 1827

For Prices, Information, etc., communicate with

HENRY KATTEN

22 Kiukiang Road

Consolidated Safety Valves Offer Real Safety

The ordinary so-called safety valve which sticks or binds or does not blow off fast enough to take care of rapid evaporation, is not a safety valve, but a positive menace.

If some emergency in your plant obliges you to cut off a steam line, and your pressure begins to rise to the danger point, can you rely on the "safety" valve that you now have?

With Consolidateds, all doubt is removed—they meet, with a wide margin, all the requirements of safety. Each valve has stamped on it in pounds, the capacity, popping and closing pressures. Connections made according to British or Metric practice.

Our agent is prepared to quote prices on Ashcroft Gauges and Metropolitan Injectors, as well as Consolidated Safety Valves.

Manning, Maxwell & Moore, Inc.

New York

Henry Katten, 22 Kiukiang Road, Shanghai, China

CONSOLIDATED SAFETY VALVES

THE

North-China Daily News

Established in 1850 as a weekly; in 1870 as a daily

To the Reader

The "North-China Daily News" writes the history of China. It records the pulse of its politics; it reports the conditions of its finance and its markets; and it chronicles the daily doings of its people.

To the Advertiser

The greatest purchasing power in China is that possessed by readers of the "North-China Daily News." It is the newspaper which is found in every office, consular or commercial; it is the newspaper most frequently quoted both by the foreign and vernacular press; and it is the one newspaper which combines a quality with a quantity circulation—being the largest both in size and circulation in China. It was the first newspaper to publish audited circulation statements.

Subscription: Mex. $28 per annum.

(Postage Extra).

The North-China Herald

Is the weekly edition of the "North-China Daily News" for readers abroad. It contains 95 per cent. of news and is the best medium for keeping in touch with events in China when out of reach of the daily.

Subscription: Mex. $16 per annum.

(Postage Extra).

Copies of either of the above publications will be sent to anyone interested on request.

NORTH-CHINA DAILY NEWS & HERALD, LTD.,
Shanghai.

Telegraphic Address: "Herald Shanghai."—All Codes.

A NORTH-CHINA TRADE DIRECTORY

The North China Desk Hong List

Is the only Trade Directory of North China issued twice a year. Its information is the most accurate and complete. Published regularly since 1865 it has grown to 900 pages. In addition to the names and addresses of every foreign firm, resident, and missionary in China it contains the following classified information:—

SHANGHAI HONG LIST.—All firms, institutions, missions, consulates, etc., in Shanghai, with staffs, arranged alphabetically.

TRADE DIRECTORY.—A list of all Shanghai firms under their professional or trade headings.

AGENCIES.—Agencies held by Shanghai firms are listed alphabetically, with the firm's name after them.

STREET DIRECTORY.—A list of the streets of Shanghai in English and Chinese, with the occupants of all foreign and many Chinese houses, offices, and stores.

SHANGHAI WHO'S WHO.—An alphabetical list of the men of Shanghai, with their business addresses.

RAILWAYS.—A list of the Northern Railways of China, with their foreign and native staffs, including those resident in Shanghai.

RESIDENTIAL DIRECTORY.—A complete list of the foreign residents of Shanghai, arranged alphabetically, with their private addresses.

OUTPORT HONG LIST.—A list of Northern and Central China cities and outports with foreign firms and institutions and their staffs.

OUTPORT WHO'S WHO.—An alphabetical list of foreign men in Northern and Central China, compiled from the Outport and Railway Sections of this work.

OUTPORT LADIES' LIST.—An alphabetical list of foreign ladies, not engaged in mission work, resident in Northern and Central China.

OUTPORT MISSIONARIES.—Classified alphabetically by provinces. Under the names of the provinces are given the towns where missions are established, with list of residents. This is divided into two sections: (1) Protestants, (2) Roman Catholics. Mission Institutions, such as Schools, Colleges, etc., will be found under the respective Ports in which they are instituted.

MISSIONS WHO'S WHO.—An alphabetical list of missionaries of each denomination, compiled from the previous section.

GENERAL.—Consular, postal, exchange and other information.

PRICES:

Shanghai **$8** with map **$6** without map

On Sale at the Offices of

The North-China Daily News

(Temporary offices during rebuilding)

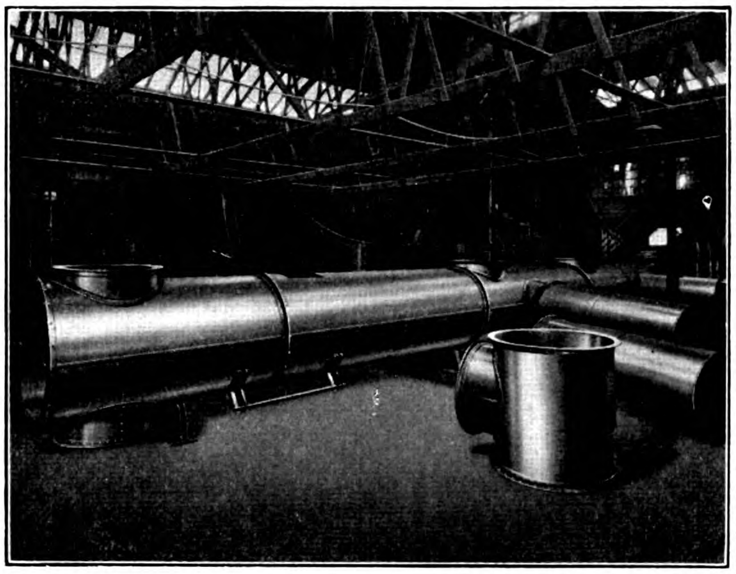
2B Kiukiang Road, Shanghai

ARCHIBALD LOW & SONS, LTD.

MERKLAND WORKS

PARTICK, GLASGOW, SCOTLAND

Telegrams: "HIGHLOW GLASGOW" Code A. B. C.



Makers of:

Rivetted or Welded Steel Pipes, Storage Tanks for Fuel Oil, Water, etc.

Steel Pipes for Oil, Steam and Water with Flanges, Screwed, Expanded or Welded and Bends made to Drawings or Specification up to 14-in. diameter Funnels, Ventilators and all classes of Sheet Iron work. Seamless Coils for Heating and Refrigerating, etc.

Specialists in Oil Fuel Pipes and Pumping Installations

Coppersmith work of all description

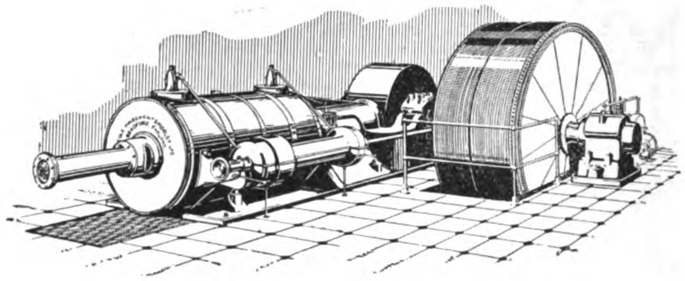
Instantaneous and Storage Steam Calorifiers

STEAM AND HOTWATER Radiators

"Bonlow" Patent Automatic Tank Gauge

"Highlow" Electric Heating and Cooking Apparatus

Catalogues and quotations on request.



C. M. & M. CENTRAL EXHAUST STEAM ENGINE

100 to 3,000 I.H.P.

The ideal Prime Mover for driving Mills and Plant where moderate power from 100 to 3,000 I.H.P. is required

PRINCIPAL FEATURES

ECONOMY: The steam consumption equals that of a good Triple Expansion Engine.

SIMPLICITY: This type of engine is undoubtedly the simplest economical engine of the present day.

UPKEEP COSTS: Owing to the low steam consumption, simplicity and to the fact that forced lubrication is fitted, upkeep costs and attendance are reduced to the minimum.

FLOOR SPACE OCCUPIED: Is considerably less than that required by Horizontal Compound Engines.

The above illustration is of a 1,500 I.H.P. C.M.& M. Central Exhaust Steam Engine recently shipped to Hankow, China.

Write to-day for Catalogues Nos. 63 & 69, which will be sent post free on request.

ESTA. 1848

REG. TRADE MARK

Cole, Marchent & Morley, Ltd.

Bradford, England

Cables: "Cole Bradford"

Electrical Plant for all purposes

We are manufacturers of every kind of Electrical Apparatus from large Turbo-Alternator Sets to simple Bell Pushes. We manufacture the whole of the apparatus necessary for the generation, transmission and utilisation of Electrical Energy.

Steam Turbines, Condensers, Alternators, Transformers and High Tension Switchgear, Rotary Converters, Low Tension Switchgear, Control Apparatus and Large and Small Motors suitable for all Industrial and Traction purposes.

Lamps, Lamp Fittings, Accessories, Heating and Cooking Appliances and Bell Pushes.

Send your enquiries to our representatives in your district:

METROPOLITAN Vickers
ELECTRICAL CO., LTD.
MANCHESTER ENAGLND

Sole Distributors for China

Messrs. Arnhold Bros. & Company, Limited.

SHANGHAI

Tientsin, Hankow, Peking, Changsha, Newchwang, Chungking, Mukden, Ichang, Harbin, Shansi, Hongkong, Canton

Humber

STANDARD MODELS.

11.4 h.p. 2-Seater (with double Dickey Seat)
11.4 h.p. Coupé (with double Dickey Seat)
11.4 h.p. 4-Seater — 15.9 h.p. 5-Seater
11.4 h.p. Saloon — 15.9 h.p. Saloon

HUMBER LIMITED.

Works:
COVENTRY, ENGLAND.

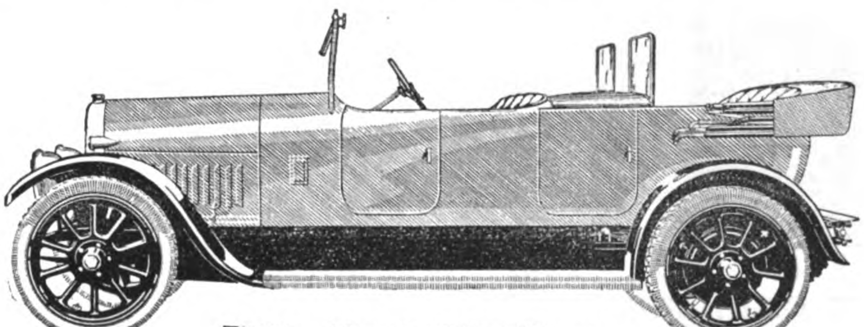
Export Dept.:
Humber House, 94, New Bond St.,
LONDON.

The High Average Car

RIGHTLY acclaimed as "a model of luxurious comfort and superb refinement," the Humber 15.9 h.p. 5-seater Touring Car is indeed a triumph of engineering skill and accomplishment.

It is described by independent Motor experts as exactly what a 5-seated owner-driver's car should be in the matter of general arrangement and equipment of both chassis and body.

All Humber Cars are fitted with detachable steel Artillery Wheels suitable for all climates. All open models are fitted with the Humber All-weather Hood (with side curtains opening with the doors) which provides for complete protection even in tropical rains.



15.9 h.p. All-weather 5-Seated Tourer.

A. J. MORSE & SON, Inc.
221 High St., Boston, Mass., U.S.A.
Established 1837

DIVING APPARATUS

Special Apparatus built to order
FRANK L. STRONG, *Agent—24 Calle Echague, Manila, P.I.*

PUBLISHED ANNUALLY

THE LONDON DIRECTORY

with Provincial & Foreign Sections,
enables traders to communicate direct with
MANUFACTURERS & DEALERS
in London and in the Provincial Towns and Industrial Centres of the United Kingdom and the Continent of Europe. The names, addresses and other details are classified under more than 2,000 trade headings, including
EXPORT MERCHANTS
with detailed particulars of the Goods shipped and the Colonial and Foreign Market supplied ;
STEAMSHIP LINES
arranged under the Ports to which they sail, and indicating the approximate Sailings.

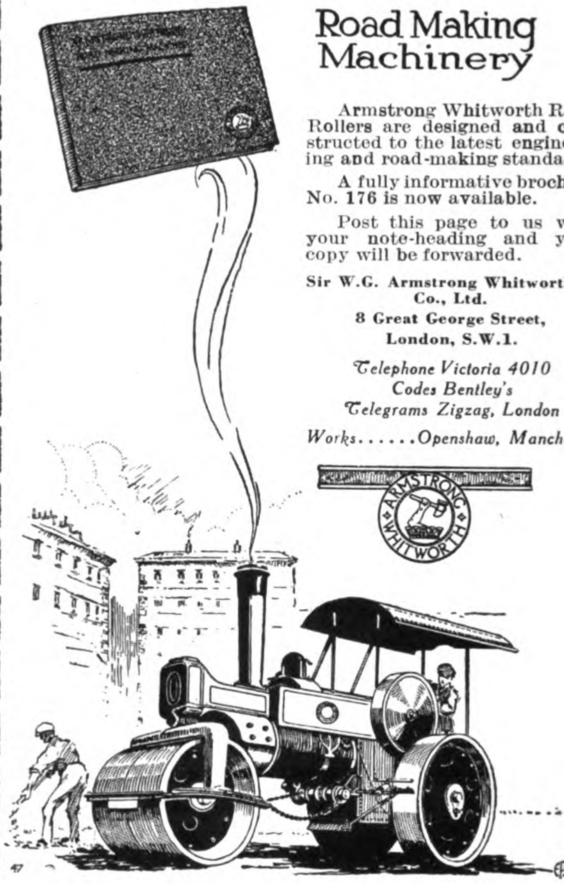
One-inch BUSINESS CARDS of Firms desiring to extend their connections or Trade Cards, of
DEALERS SEEKING AGENCIES
can be printed at a cost of £1.10.0 for each trade heading under which they are inserted. Larger advertisements from £2 to £16.

A copy of the directory will be sent by parcel post for £2, nett cash with order.

THE LONDON DIRECTORY CO., LTD.
25 Abchurch Lane, London, E.C. 4, England
BUSINESS ESTABLISHED IN 1814

ARMSTRONG-WHITWORTH

SHIPS
MARINE ENGINES
LOCOMOTIVES
MACHINE TOOLS
FORGINGS CASTINGS
DROP STAMPINGS
HIGH SPEED STEELS
SMALL TOOLS GAUGES
PNEUMATIC TOOLS
NON-FERROUS PRODUCTS
OIL & GAS ENGINES
HYDRAULIC MACHINERY
HYDRO-ELECTRIC PLANT
GENERAL ENGINEERING
CIVIL ENGINEERING
ROAD ROLLERS



Road Making Machinery

Armstrong Whitworth Road Rollers are designed and constructed to the latest engineering and road-making standards.

A fully informative brochure No. 176 is now available.

Post this page to us with your note-heading and your copy will be forwarded.

Sir W.G. Armstrong Whitworth & Co., Ltd.
8 Great George Street, London, S.W.1.

Telephone Victoria 4010
Codes Bentley's
Telegrams Zigzag, London
Works......Openshaw, Manchester

AWARDED GRAND PRIZE OF HONOUR
PANAMA PACIFIC EXHIBITION, SAN FRANCISCO, 1915.
MOST POPULAR **BEER** IN THE ORIENT

ASAHI **YEBISU** **SAPPORO**
BREWED BY
THE DAI NIPPON BREWERY CO., LTD.
HEAD OFFICE: TOKYO
BRANCHES OSAKA, SAPPORO, SEOUL, SHANGHAI, TSINGTAO.
SOLD EVERYWHERE
Agents: MITSUI BUSSAN KAISHA,
China, Straits Settlements, Dutch East Indies, and British India

THE FAR EASTERN MANUAL
of
FINANCE and INDUSTRY, 1923

Eastern Asia is the battleground for world trade supremacy. The largest and most profitable fields for investment and commercial expansion lie beyond the western shores of the Pacific. Accurate knowledge of the Finances and Industries of these countries is the first essential to successful and profitable trade.

THE FAR EASTERN MANUAL of Finance and Industry is being compiled, in order to meet this growing demand for reliable information on the industries, machinery users and financial institutions in this part of the world. The book will contain over 1,500 pages of solid reports, including numerous maps of railways, tramway systems and mining areas.

HAVE YOU SUBSCRIBED?

PRICE $25.00

PUBLISHED BY

THE FAR EASTERN REVIEW
SHANGHAI—CHINA

ENGINEERS!

DO YOU KNOW

?

There are over 350 government, private railways and tramways in Eastern Asia. About 1,500 electric light and power plants: Some 300 cotton mills: 250 sugar mills: at least 500 mines: 100 dockyards and shipbuilders: not be mention machine shops, and other industrial plants who purchase engineering supplies of all kinds ?

Reports on *all* these companies will be listed in :—

The Far Eastern Manual

of

FINANCE AND INDUSTRY

Sample pages on request

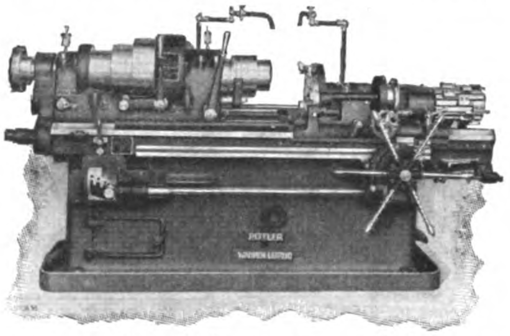
The FAR EASTERN REVIEW

Publishers

5 Jinkee Road, Shanghai

The

PITTLER TURRET LATHE



One of the Factors of German Industrial Efficiency

Catalogue containing valuable information about up-to-date machining methods free on request

PITTLER

Werkzeugmaschinenfabrik A.-G.

LEIPZIG - WAHREN

Makers of: Genuine Pittler Turret Lathes, Single-spindle and Multiple-spindle, Automatic Screw Machines, Automatic Pin and Stud Lathes, Self-opening Die-Heads

Transatlantische Handelskompagnie m.b.H.

HAMBURG

Cable address: Handelslot.—Codes: A.B.C. 5th, 6th Bentley, Carlowitz

Speciality Export of :
- Steel Bars, Plates, Girders, Wire, Wire-nails, Hardware, Cutlery.
- All kinds of Paper.
- Drugs & Chemicals & Sundries.

Seeks connections with 1st class buyers or importers.

Large German Manufacturing Works of Material for Light and Standard Railways want to enter into **Business Connection** with first class firms who can show proof that they are well introduced among the respective customers. Offers invited to *F.H.D.* 418, c/o *Rudolf Mosse, Berlin, S.W.* 19.

The illustration shows Oster No. 304-A which threads all pipe sizes from 1 to 4 inches, and bolts from $\frac{1}{2}$ to $1\frac{5}{8}$ inches.

ONE man and an Oster Power Machine (belt or motor drive) can out-thread a gang using hand tools.

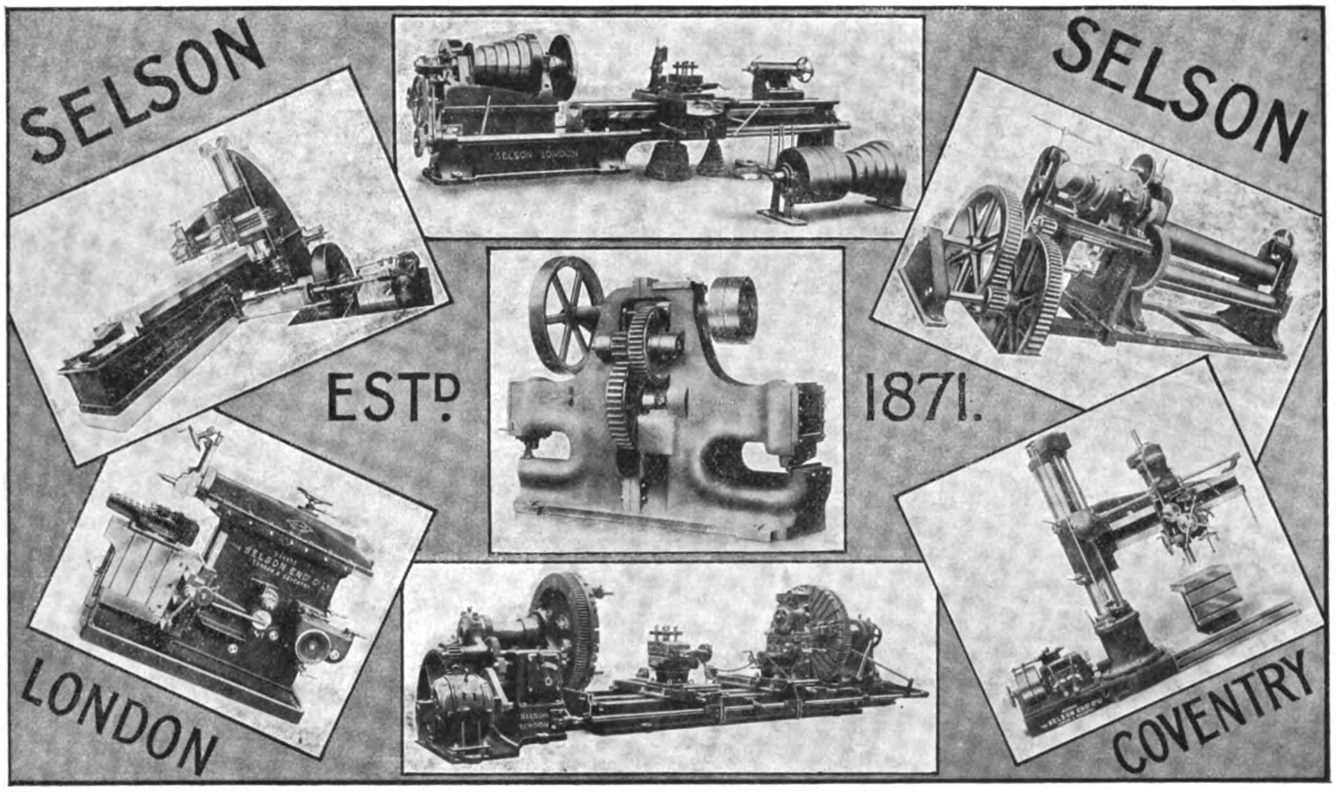
Threads can be duplicated indefinitely at high speed on straight pipe, bent pipe, nipples and bolts.

Built in four sizes, Oster machines are so simple in control and operation that a boy can operate them successfully.

THE OSTER MFG. CO., EAST 61ST PLACE, CLEVELAND

OSTER

POWER-DRIVEN THREADING NACHINES



83 & 85 Queen Victoria Street, London, E.C. 4 Cable Address: "SELSONEER" London

Some Outstanding Features of the Walworth Complete Line for Oil Fields and Refineries

FIG. W4104

ALL WALWORTH QUALITY

FIG. W2621
IRON BODY GATE VALVE

Standard Malleable Fittings and Nipples, Extra Heavy Cast Iron Fittings, Hydraulic Steel Fittings, "Kewanee", National and Oil Country Flange Unions, Power Plant Material of all Kinds.

"Genuine Walworth Stillson" and Reversible Bostong Pipe Wrenches, Standard Globe, Angle and Check Brass Gate Valves, Standard and Extra Heavy Iron Body Gate Valves with Non-Rising Stem. Extra Heavy Iron Cocks.

FIG. W1323
HYDRAULIC FITTING

FIG. W3782
IRON COCK

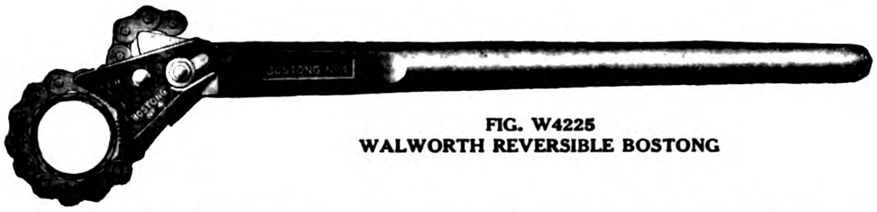


FIG. W4225
WALWORTH REVERSIBLE BOSTONG

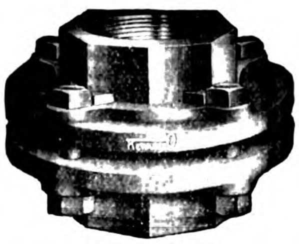


FIG. W2351
"KEWANEE" FLANGE UNION

WALWORTH MANUFACTURING COMPANY

Oldest continuous manufacturers in the United States (since 1842) of a complete line of Valves, Fittings and Tools for steam, water, oil, gas, and air. Originators of the Famous "GENUINE WALWORTH STILLSON" Wrench and the "KEWANEE" Union.

Export Sales Agents: WALWORTH INTERNATIONAL COMPANY, New York City, U. S. A.

Foreign Sales Offices in All Principal Cities

For catalog, prices or information address

HENRY KATTEN 22 Kiukiang Road Shanghai, China

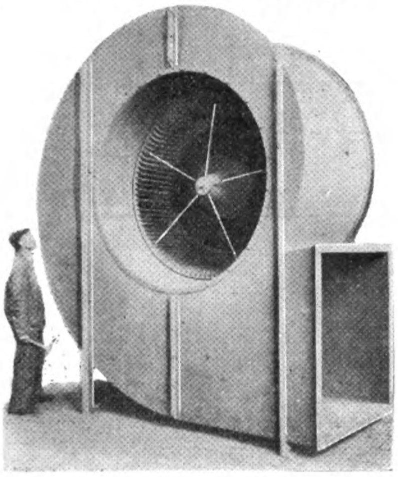
SULZER BROTHERS

SULZER CENTRIFUGAL PUMPS AND FANS

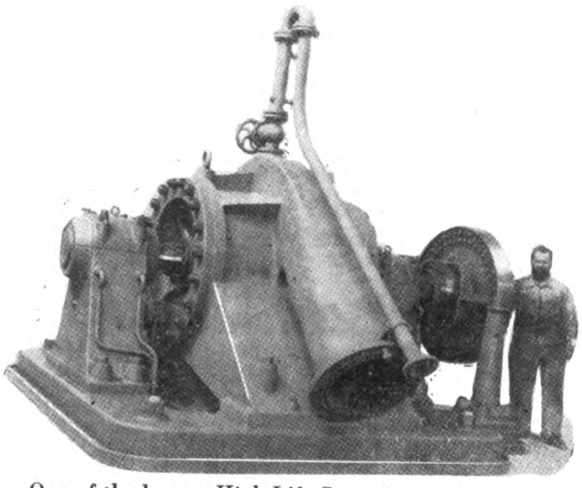
IN ALL SIZES AND FOR ALL PURPOSES

蘇爾壽

上海愛多亞路四號



Large Low Pressure Centrifugal Ventilator



One of the largest High Lift Centrifugal Pumps in the world, 4,000 B.H.P.

目錄及關於工業上之問答等請直接本公司惟望指明經何進口行則公司可與之接洽一切也

SULZER BROTHERS

ENGINEERING OFFICE, SHANGHAI

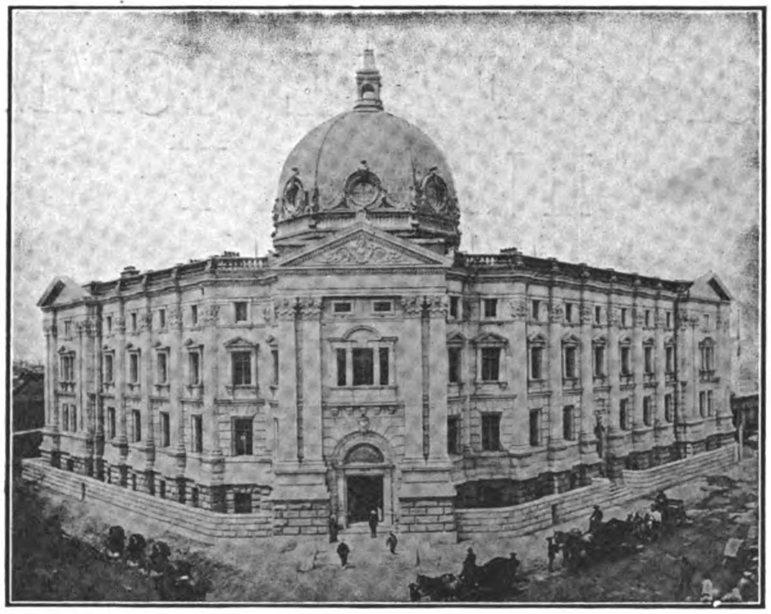
4 Ave. Edward VII.

Telephone, C. 6512 Cables, "SULZERBROS."

OTHER PRODUCTS OF OUR WORKS

SULZER UNIFLOW STEAM-ENGINES, UPRIGHT WATER-TUBE BOILERS, STATIONARY AND DIRECT REVERSIBLE DIESEL MARINE ENGINES, ICE AND REFRIGERATING MACHINERY, CENTRAL HEATING INSTALLATIONS, MAAG GEARS, ELECTRO BOILERS, ETC.

WINTERTHUR. SWITZERLAND.



HEAD OFFICE, YOKOHAMA

Capital (Fully Paid-Up):
Yen 100,000,000

Reserve Fund:
Yen 61,000,000

CORRESPONDENTS
AT ALL
THE CHIEF
COMMERCIAL CITIES
IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: KENJI KODAMA, Esq.
Vice-President: REITARO ICHINOMIYA, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASUNOSUKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
NAKAJI KAJIWARA, Esq.
SHIMAKICHI SUZUKI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
BARON KAISAKU MORIMURA
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.
HIROZO MORI, Esq.
KUNIZO MOGAMI, Esq.

Head Office: YOKOHAMA
Manager: N. IGARASHI, Esq.

TOKYO BRANCH
No. 1, Itchome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES.

Batavia	Dairen	Hongkong	Los Angeles (*sub-office of San Francisco Branch*)	Nagoya	Rangoon	Shanghai	Tientsin
Bombay	Fengtien	Honolulu	Lyons	Newchwang	Rio de Janeiro	Shimonoseki	Tsingtau
Buenos Aires	Hamburg	Kaiyuang	Manila	New York	Saigon	Singapore	Tsinan
Calcutta	Hankow	Kobe	Nagasaki	Osaka	San Francisco	Sydney	Vladivostock
Changchun	Harbin	London		Peking	Seattle	Sourabaya	

LONDON BANKERS

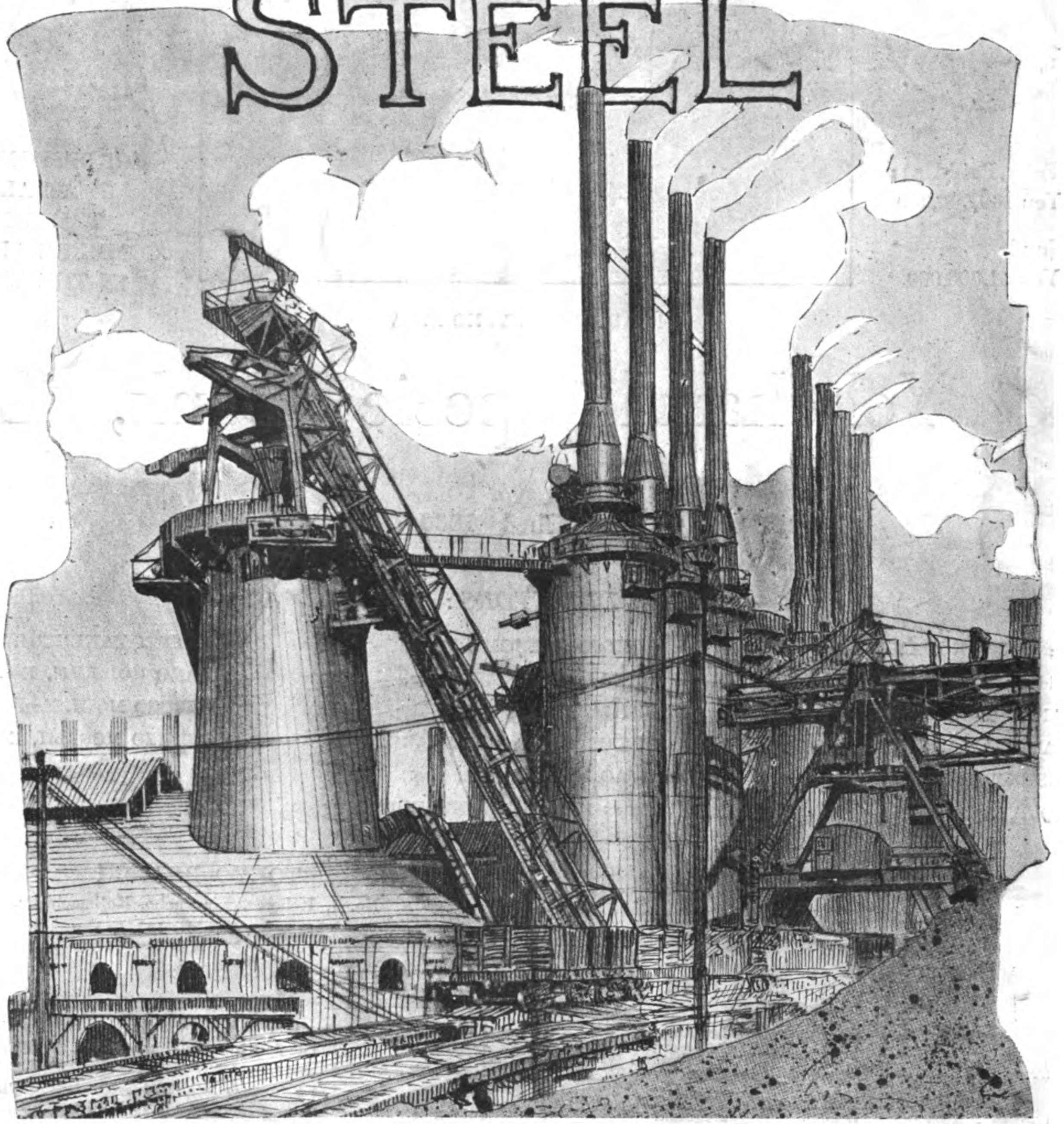
LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

**Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.**

大正七年七月十日第三種郵便物認可

THE BASIS OF ALL COMMERCIAL INDUSTRY

STEEL



Blast Furnace Plant of the National Tube Company

SOLE EXPORT REPRESENTATIVES

UNITED STATES STEEL PRODUCTS COMPANY

SHANGHAI OFFICE: Union Building, The Bund and Canton Road
PEKING OFFICE: No. 22 Wu Liang Ta Jen Hutung
TOKYO OFFICE: No. 15 Nakadori, Marunouchi

Printed by NORTH-CHINA DAILY NEWS AND HERALD, LTD,. for the Proprietor

大正七年七月十日第三種郵便物認可

P.P. 9990.aj

THE FAR EASTERN REVIEW

FINANCE ENGINEERING COMMERCE

上海仁記路第五號

遠東時報

ENGINEERING PROGRESS IN KOREA

RAILWAYS IN THE HOKKAIDO

ELECTRICAL DEVELOPMENTS IN JAPAN

TIN MINING IN CHINA

CONSERVANCY WORK IN CHINA

BUILDING PORTS IN MALAYA

FAR EASTERN MOTORS

Vol. XVIII | September, 1922 | No. 9

A.L. TAYLER.

First in the Field—

FIG. W4161. Nos. 0 to 1¾, without Leader Screw

FIG. W4162. Nos. 2, 3, 4, with Leader Screw

WALWORTH DIE PLATES

Lack of die plates suitable for field work forced us in the early sixties to invent the Walworth Die Plate. It met with such a prompt and steady demand that it has remained the model for all die plates of this type.

WALWORTH MANUFACTURING COMPANY

Oldest continuous manufacturers in the United States (since 1842) of a complete line of Valves, Fittings and Tools for steam, water, oil, gas, and air. Originators of the Famous "GENUINE WALWORTH STILLSON" Wrench and the "KEWANEE" Union.

Export Sales Agents: WALWORTH INTERNATIONAL COMPANY, New York City, U. S. A.

Foreign Sales Offices in All Principal Cities

For catalog, prices or information address

HENRY KATTEN

22 Kiukiang Road Shanghai, China

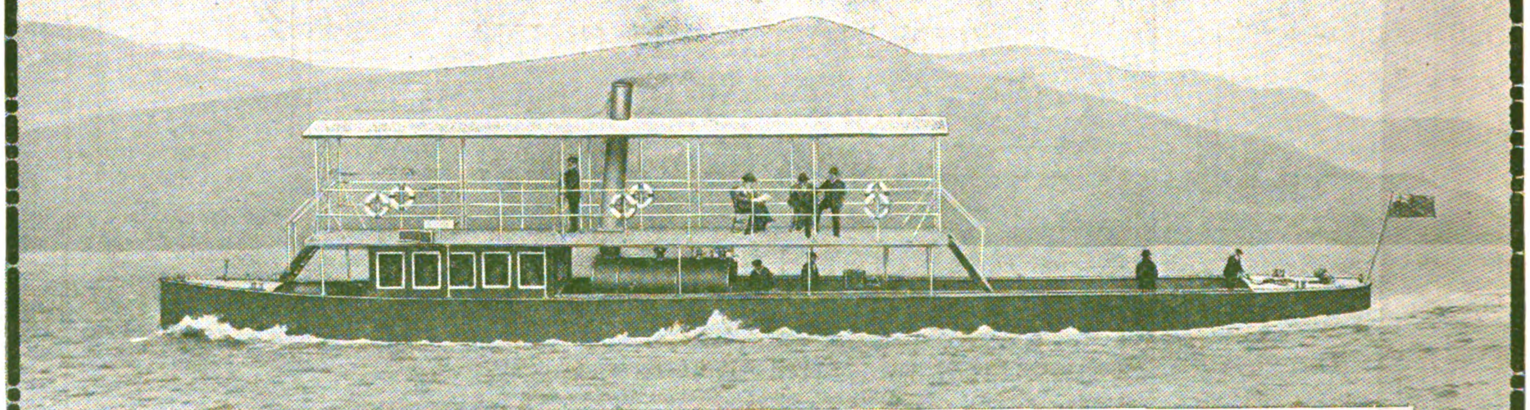
SHALLOW DRAUGHT LAUNCH—YARROW SYSTEM,

built by

YARROW & CO., L^TD., Glasgow,

(formerly of Poplar, London).

Yarrows, Limited, of Victoria, British Columbia, Shipbuilders, Ship Repairers and Engineers, are associated with Yarrow & Co., Ltd., Glasgow.



Length, 160-ft.; Beam, 24-ft. 6-in.; Draft, carrying 40 tons 2-ft. 3-in.; Speed, carrying 40 tons 15 Statute miles an hour, burning wood fuel only

Vessel as above illustrated can be shipped whole to any part of the world.

Messrs. YARROW Construct Fast Passenger and Commercial Vessels, Shallow Draught Steamers, Tugs, etc., propelled by Sternwheels, Side Wheels, or Screws working in Tunnels fitted with Yarrow's Patent Balanced Hinge Flap.

RIELLEY, SIMMONS & MILNE, Agents, Shanghai.

FOUNDED, 1904

The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.

HEAD OFFICE: 5 JINKEE ROAD - - - - SHANGHAI, CHINA.

George Bronson Rea, *Editor and Publisher*

William Carter Rea, *Advertising Manager*

JAPAN OFFICE: H. C. Huggins, Representative, No. 12 Takagi-cho, Akasaka-ku, Tokyo.

NEW YORK: British and Colonial Press, Inc., 738 The Knickerbocker Building, Broadway and 42nd Street.

MANILA OFFICE: Fleming, Percy Smith and Seth, Roxas Building, Escolta.

BERLIN: Rudolf Mosse, 46-49 Jerusalemer Strasse.

GREAT BRITAIN: Walter Judd, Ltd., 81-87 Gresham Street Bank, London, E.C.

SAN FRANCISCO: Leroy P. Boyce, Monadnock Building

SUBSCRIPTION IN CHINA: $10.00 Mexican, U. S. & Philippines Gold $5.00, Elsewhere $12.00 Mexican per annum

VOL. XVIII SEPTEMBER, 1922 NO. 9

CONTENTS:

	PAGE
ENGINEERING PROGRESS IN KOREA	*533
HARBOR CONSTRUCTION IN KOREA	*539
THE NEW PACIFIC BUILDING, MANILA	*542
INDUSTRY IN THE HOKKAIDO	*543
RAILWAYS IN THE HOKKAIDO	*546
IDEAL INDUSTRIALISM IN JAPAN	*549
Chinese Chemists Organize	552
ELECTRICAL DEVELOPMENTS IN JAPAN	*553
SWITCHING LOCOMOTIVE FOR CHINA	*556
BUILDING PORTS IN MALAYA	*557
CONSERVANCY WORK IN CHINA	*559
THE MANILA RAILWAY COMPANY	561
PROPOSED BRIDGE ACROSS THE PEARL RIVER	*562
KITCHEN'S REVERSING RUDDERS	*563
Peking Electric Tramway	564
EDITORIALS:	
Facing the Facts	*565
"China's Financial Independence"	568
The Goat	569
The Creaking of the Shantung Door	570
An Engineer Educator	*572
Days of the Compradore are Numbered	573
THE KOCHIU TIN MINES	*574
IRON AND STEEL IN INDIA	*578
N. E. I. RAILWAY ELECTRIFICATION	*579
FAR EASTERN MOTORS:	
Motor Manufacturing in Japan	*581
Motors and Roads in the N. E. I.	*589
Airplane Lubrication for Autos	*596
The Kwangtung Tramway Co., Ltd.	*597
Motor Transportation in the Philippines	*599

*Illustrated with Maps or Photographs

Entered at the U.S. Postal Agency, Shanghai, China, as second-class matter. Registered at the Chinese Post Office as a Newspaper. Entered at the Japanese Post Office as a Newspaper.

ALPHABETICAL LIST OF ADVERTISERS

Admiral Line, The 41
Allen & Co., Ltd., Edgar 33
American LaFrance Fire Engine Co. Supt
American Locomotive Sales Corp..... 25
American Tool Works Co. 1
Andersen, Meyer & Co., Ltd. 28
Armstrong, Whitworth & Co. Ltd., Sir W. G. 72
Asbestos Shingle, Slate & Sheathing Co. 17
Ashton Frost & Co., Ltd. 19
Atlantic, Gulf & Pacific Co. of Manila 36
Attwater & Sons 48
Avery, Ltd., W. & T. 11

Babcock & Wilcox, Ltd. 31
Baldwin Locomotive Works 65
Bank of Chosen 52
Bank of Communications 57
Banque de l'Indo-Chine 54
Bank of Taiwan, Ltd. 55
Bliss Co., E. W. 27
Brill Co., J. G. 39
British-American Tobacco Company (China), Ltd. 62
Brunswick Kroeschell & Co. 71
Bucyrus Company 9
Butterfield & Swire 42

Canada Carbide Co. 15
Chartered Bank of India, Australia & China 48
Chicago, Milwaukee & St. Paul Railway 15
Clough, S. W. 4
Cole Marchent & Morley, Ltd. 76
Consolidated Steel Corporation 14
Craig & Donald, Ltd. 31

Dai-Ichi Ginko 60
Dai Nippon Brewery Co. 72
Diamond Power Specialty Corporation 63
Dixon Crucible Co., Joseph .... Supt

Dorman Long & Co., Ltd. 3
Drewry Car Co., Ltd. 19
Drysdale & Co., Ltd. 71

Electricity Department, S. M. C. 4
English Electric Co., Ltd. 8
Evans & Sons (Wolverhampton), Ld., Joseph 2

Fuji Gassed Spinning Co. 10

Gleniffer Motors, Ltd. .... Supt
Green Island Cement Co., Ltd., The.. 20
Greenfield Tap & Die Corp. 11
Greening & Sons, Ltd., N. 4

Heap & Co., Ltd., Joshua 51
Hongkong Rope Manufacturing Co. . 20
Hongkong & Shanghai Banking Corporation 61
Hongkong & Whampoa Dock Co., Ld. 30
Hotel Statler Co. 49
Humber, Ltd. .... Supt

Imperial Japanese Government Railways 66, 67
Industrial Bank of Japan 56
International Banking Corporation.. 53

Japan Sugar Mfg. Co. 6
Jardine, Matheson & Co., Ltd. 12 & Supt
Jones & Lamson Machine Co. 51
Jugo Ginko 54

Kanegafuchi Spinning Co., Ltd. 10
Kawasaki Dockyard Co., Ltd. 35
Kellogg Switchboard & Supply Co... 63
Kelvin, Bottomley & Baird, Ltd. 13

Kokusai Kisen Kaisha 43
Koster Co., The 39

London Directory Co., Ltd. 72
Low & Sons, Ltd., Archibald 75

Manning, Maxwell & Moore, Inc. 76
Mather and Platt, Ltd. 7
Matthews & Yates, Ltd. 72
Metropolitan Vickers Electrical Co., Ltd. 75
McClintic-Marshall Products Co. 27
McConway and Torley Co. 21
Mitsubishi Bank 59
Mitsubishi Iron & Steel Co., Ltd. 38
Mitsubishi Marine & Fire Ins. Co., Ld. 38
Mitsubishi Shoji Kaisha 18
Mitsubishi Warehouse Co. 38
Mitsubishi Zosen Kaisha, Ltd 26
Mitsui Bank 59
Mitsui Mining Co. 18
Mitsui Bussan Kaisha 26
Motor Rail & Tram Car Co. 41
Mustard & Co. 4

New Engineering & Shipbuilding Works 34
Nippon Menkwa Kabushiki Kaisha.. 50
Nippon Yusen Kaisha 46, 47
Nobel Industries, Ltd. 22

Okura & Co. (Trading), Ltd. 24
One Hundredth Bank, Ltd., The 60
Osaka Shosen Kaisha 44

Pacific Steamship Co. 41
Pittsburgh Steel Co. 71
Pittler Turret Lathe 74
Pooley & Son, Ltd., Henry 2

Reay Gearworks, Ltd. 74
Republic Truck Sales Corp. .... Supt

Royal Bank of Canada 61
Ruston & Hornsby, Ltd. 21
Ryerson & Son, Joseph T. 5

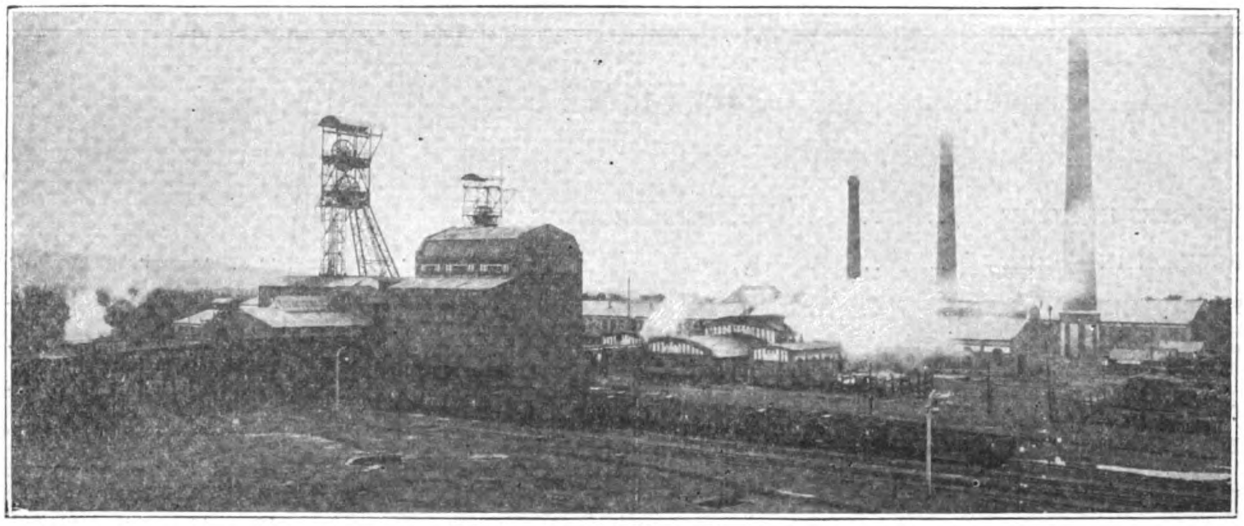
Sale & Frazar, Ltd. 16
Scottish Tube Co., Ltd. 13
Shanghai Dock & Eng. Co., Ltd. 32
Shanghai Municipal Council 4
Shantung Railways 70
Simons & Co., Ltd., Wm. 19
South Manchuria Railway Co. 64, 68, 69
Standard Oil Co. of N. Y. .... 29 & Supt
Stewarts & Lloyds, Ltd. 15
Sumitomo 58
Sumitomo Bank, Ltd. 58
Superheater Co., The 71

Thornycroft & Co., John I. 1
Toshin Soko 40
Toyo Kisen Kaisha 45
Transatlantische Handels-Kompagnie, m.b.h. 74
Trimont Manufacturing Co. 9

United Brassfounders & Engineers, Ltd. 61
United Cigarette & Machine Co. 41
United States Steel Products Company .... 23, 37, Back Cover

Walworth International Co. .... Cover
Werf Gusto 63
Wharton Jr. & Co. Inc., Wm. 21
Whittall & Co., Ltd., J. 6
Wild & Co., M. B. 9
Williams & Co., J. H. 7

Yarrow & Co., Ltd. .... Cover
Yokohama Dock Co. Ltd. 33
Yokohama Specie Bank, Ltd. .... Cover



The Tzuchuan Colliery, Shantung

TZUCHUAN COAL

The Cheapest and Best Coal Mined in the Far East

Annual Output : 600,000 tons.
The Coal is washed, screened, and classified for the market into five grades, viz., Lump, Slack, and Washed Coal Nos. 1, 2 and 3.
Tzuchuan Coal contains a large amount of coke, with only a small amount of ash, and has a heating capacity of 7,500 calories.
Tzuchuan Coal, which rivals the best Cardiff Coal, is highly recommended for Coke and Briquette manufacture, for Boiler and Marine use and for General Domestic use
Tokuyama Briquette Factory, Yawata Iron and Steel Works, and many other important works in Japan and China are constant purchasers.
The Wharves at Tsingtao are well accommodated as Coaling Stations for Coast and Ocean liners.

For further information please apply to the

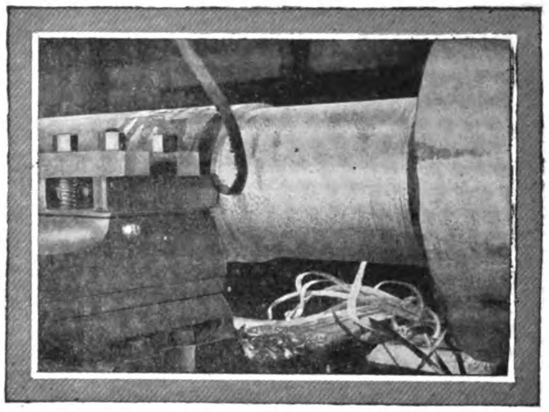
SHANTUNG RAILWAY ADMINISTRATION

Cable Address: "SANTETSU" TSINGTAO, CHINA Codes: A.B.C. 5th Ed. & A.1.

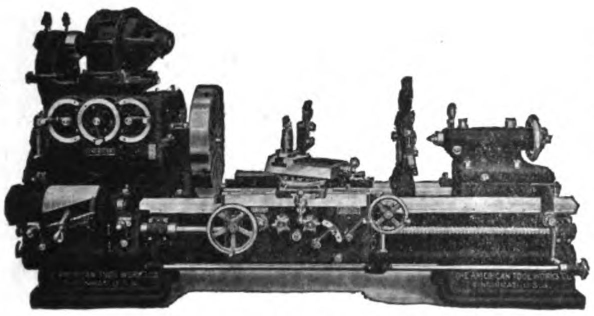
POWER!!

3120 lbs. of .40 Carbon Steel Removed Per Hour

During a recent demonstration a 30-inch **"American" Motor Driven Lathe** removed .40 carbon steel at the rate of 3120lbs. per hour.



$\frac{1}{2}$" deep x $\frac{1}{8}$" feed, 156 F.P.M. cutting speed
$6\frac{1}{2}$" dia. of work

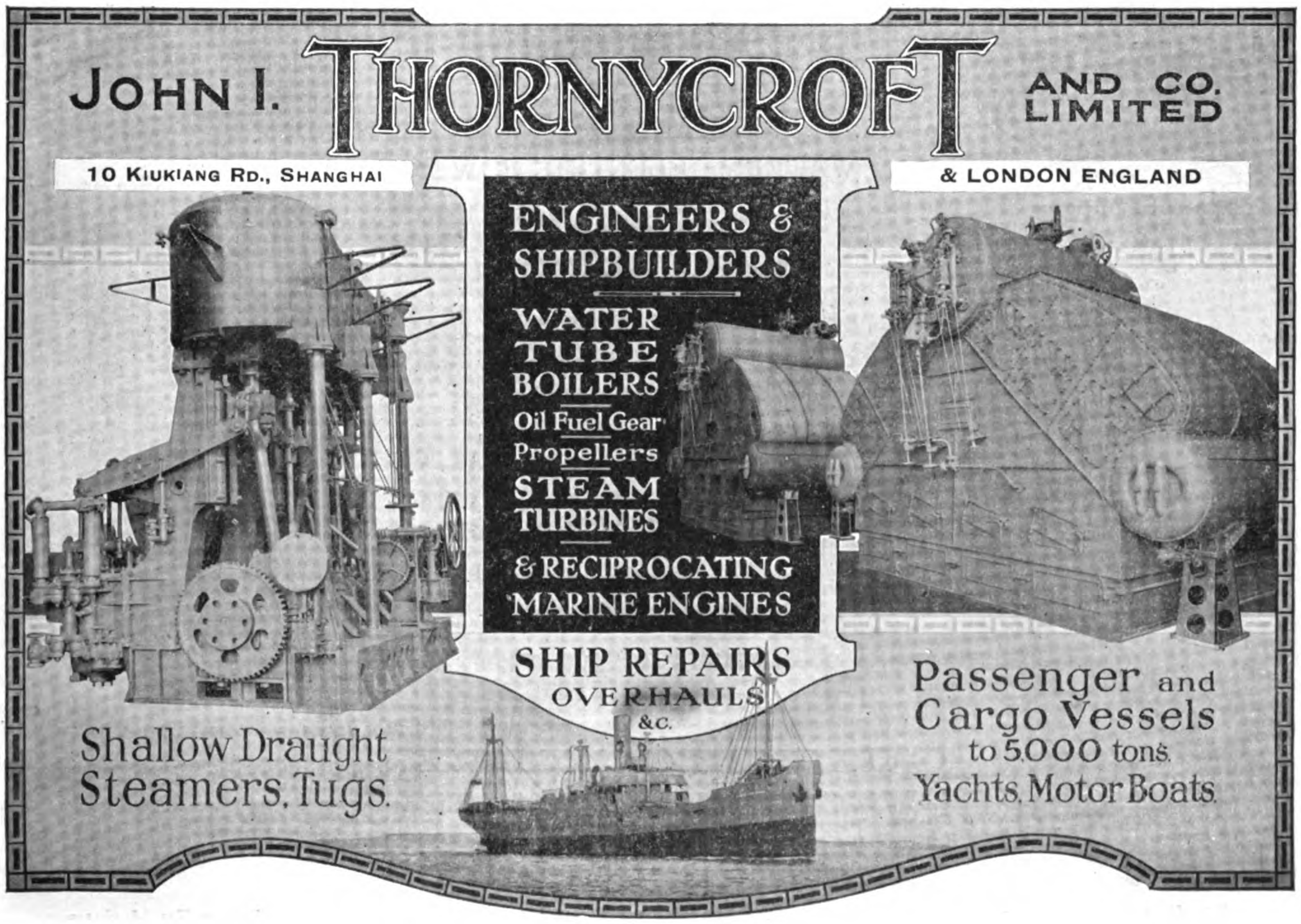


It takes tremendous power and ruggedness to do such work as that, but "American" Lathes are built for such service—to produce your work in the very shortest possible time and at the lowest cost.

Our Efficiency Bulletin will tell you more about their qualifications
It's Free—Write for it

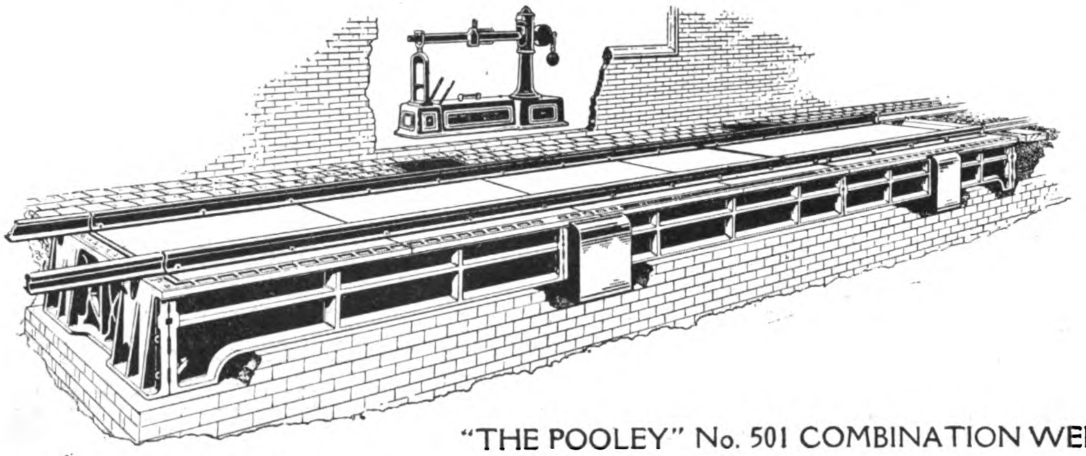
Agents: **Andersen, Meyer & Co., Ltd., Shanghai and Manchuria**
Horne Co., Ltd., Tokio, Japan
H. P. Gregory & Co., Sydney & Melbourne
Pacific Commercial Co., Manila, P.I.
Honolulu Iron Works, Honolulu, H.I.

THE AMERICAN TOOL WORKS COMPANY
Lathes-Planers CINCINNATI, U.S.A. Shapers-Radials



POOLEY

WEIGHING MACHINE
&
WEIGHBRIDGE MAKERS



"THE POOLEY" No. 501 COMBINATION WEIGHBRIDGE,
CAPACITY 70 TONS, SPECIALLY DESIGNED FOR CHINA.

HENRY POOLEY & SON L^TD
JOHN BRIGHT ST
BIRMINGHAM
ENGLAND

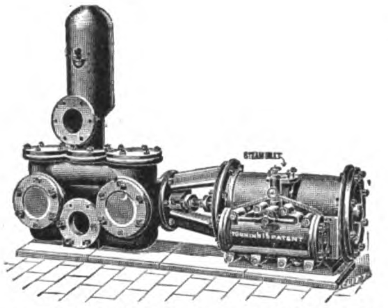
P.A. 123.

WE MANUFACTURE

PUMPS

FOR EVERY PURPOSE

To be worked by HAND, STEAM, BELT, WIND,
WATER or ELECTRIC POWER.



STEAM PUMP for General Purposes

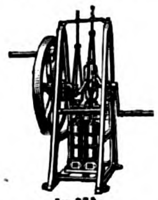
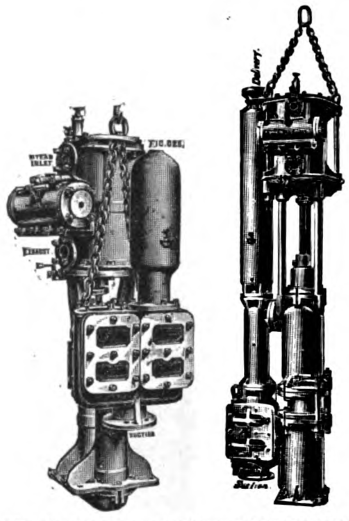


Fig. 225.

Fig. 160.



SINKING PUMPS for COLLIERIES,
MINES, Etc.

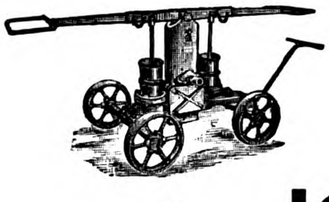


Fig. 121.

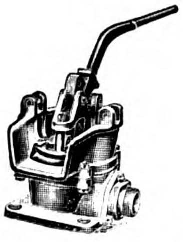


Fig. 185.

Write for "Eastern" List.

JOSEPH EVANS & SONS
(WOLVERHAMPTON) LTD

CULWELL WORKS,

WOLVERHAMPTON, ENGLAND.

Agents for China

J. WHITTALL & CO., LTD.

16 Victoria Terrace
Tientsin

12 Nanking Road
Shanghai

33 Ta Juan Fu Hutung
Peking

Stocks Kept in Tientsin and Shanghai.

DORMAN, LONG & Co., Ltd.

Steel Manufacturers,
Bridge Builders & Constructional Engineers,

MIDDLESBROUGH, ENGLAND.

Telegraphic Address:
"DORMAN-MIDDLESBROUGH."

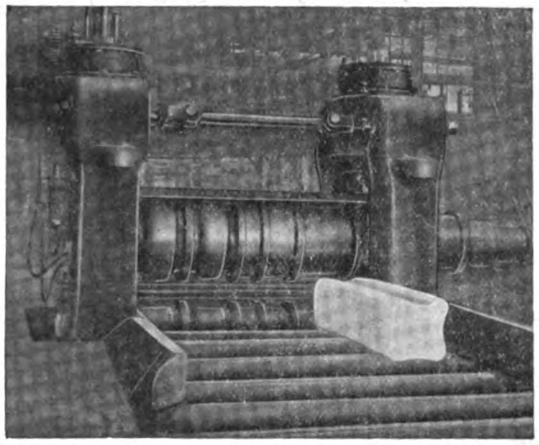
Codes —
BENTLEY'S; A.B.C. (5th and 6th Editions) and WESTERN UNION (Universal & 5 Letter).

Britannia Steelworks,
MIDDLESBROUGH.

Open-Hearth STEEL JOISTS, ANGLES and OTHER SECTIONS, RAILS.

Open-Hearth STEEL BARS in long lengths suitable for

FERRO-CONCRETE WORK, BILLETS AND BLOOMS.



Redcar Iron and Steel Works, Redcar.

Steel Works and Rolling Mill Dept.

Plate Mills capable of Rolling all Plates for **Shipbuilding and Engineering** purposes, from $\frac{3}{16}$" to $1\frac{1}{2}$" thick, fulfilling the requirements of British Standard Tests, Board of Trade, Admiralty, Lloyds, etc.
Universal Plates with Rolled Edges 12" to 42" wide up to 90-ft. long.

Clarence Steel Works and Rolling Mills,
PORT CLARENCE.

High-class Steel in quality from Dead Soft to 1.25 per cent. Carbon for the manufacture of Wire, Springs, Files, Saws, Forgings, Stampings, Rifle Barrels, Agricultural Implements, etc. Conductivity Steel to stand General Post Office, India Office and British Railway Tests.
Electrically Melted Steels of all Carbons.
NICKEL ALLOY STEEL.
Flange and Bulb Head Rails, Billets, Slabs, etc.

Ayrton Rolling Mills,
MIDDLESBROUGH.

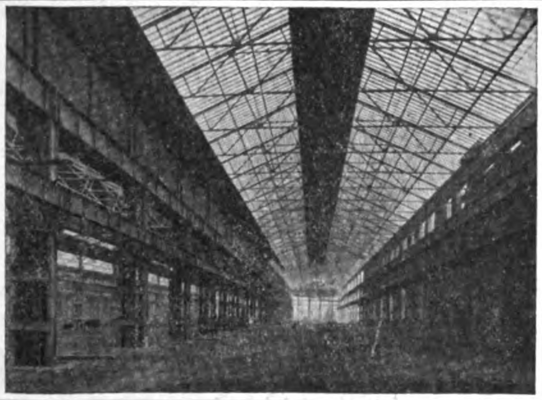
Galvanized Corrugated and Plain Sheets,

Ridging, Gutters, Downpipes, Fountain Heads, etc.

Ordinary Galvanized Fittings kept in Stock.

Cleveland Wire Mills,
MIDDLESBROUGH.

Wire Rods and all kinds of Wire for all purposes. Telegraph & Telephone Wire. Annealed Core Wire. Galvanized Seizing Wire. Galvanized Rigging Wire. Galvanized & Varnished Fencing Wire. Galvanized Strand & Barb Wire. Galvanized Cable Wire.
Galvanized Patent Steel Hawser Wire to Lloyd's Tests.
Bright Patent and Plough Steel Rope Wire.
The Mills can supply the **longest single length** of Rods or Wire without weld or joint of anyone in the Trade.



Constructional Department,
MIDDLESBROUGH.

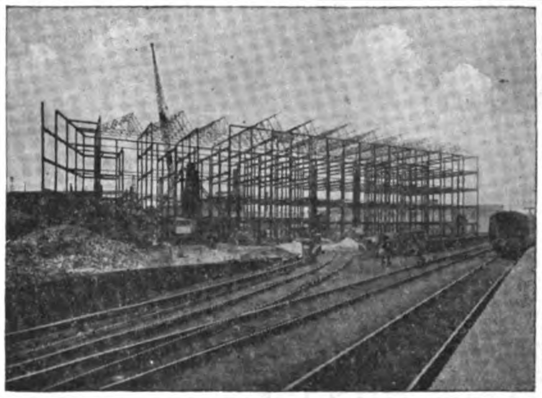
STRUCTURAL STEELWORK

for all purposes.

Speciality:

STEEL FRAME BUILDINGS

for home and abroad.



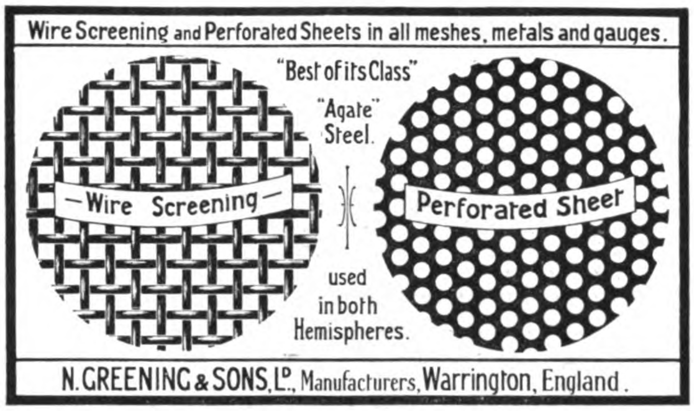
AGENTS:—

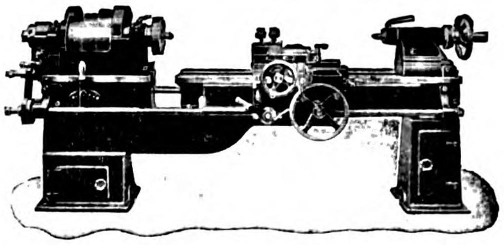
REPRESENTATION for BRITISH MANUFACTURERS, LTD.

CHING MING BUILDINGS, BRITISH CONCESSION, HANKOW.

43 KIANGSE ROAD, SHANGHAI.

REGINES BUILDINGS, LEGATION STREET, PEKING.





HEAVY

DUTY

LATHES

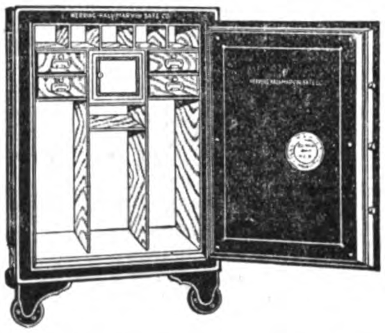
7-in. and 9-in. Centres

HIGH-CLASS MACHINES AT MODERATE PRICES

S. W. CLOUGH

REDBURN LATHE WORKS

SHIPLEY, Eng.



Unfailing Protection For Your Most Valued Possessions

HERRING-HALL-MARVIN

Safes and Bank Vaults

All sizes from the smallest Home Safe to the largest Bank Vaults, Key-Lock or Combination.

MUSTARD & COMPANY

Sole Agents for China, Hongkong and Macao.

Shanghai, Tientsin, Hankow, Hongkong, Canton, Harbin.

THE

MUNICIPAL ELECTRICITY DEPARTMENT

HAS RECEIVED DEMANDS FOR

ELECTRIC POWER

AMOUNTING TO

80,000 HORSE POWER

AND PLANS TO INCREASE ITS GENERATING PLANT TO A CAPACITY OF

180,000 HORSE POWER

DO YOU THINK

IT IS POSSIBLE TO MAKE YOUR OWN POWER AT A COST WHICH CAN COMPETE

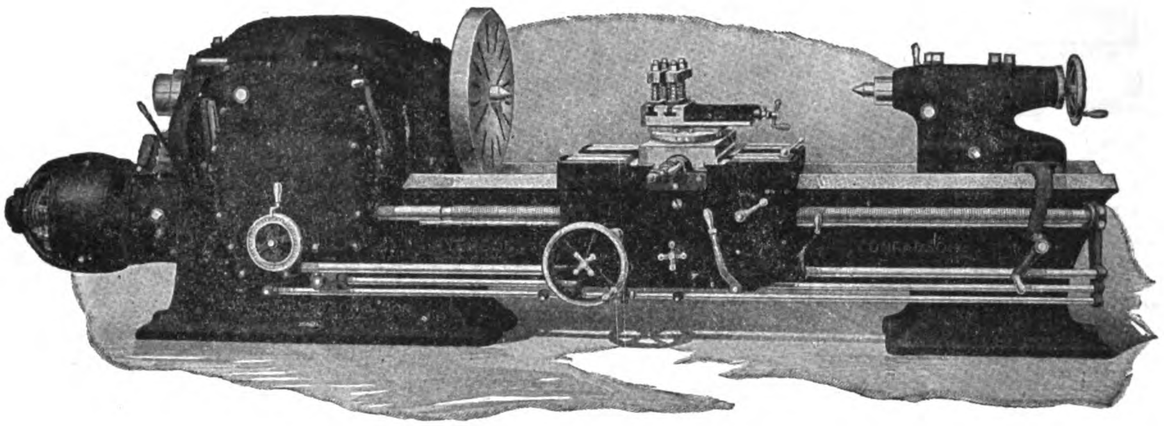
? WITH THE CHEAP RATES MADE AVAILABLE ?

BY THE OPERATION OF THIS VAST MODERN POWER PLANT?

ASK

THE POWER DEPARTMENT, FOOCHOW ROAD, SHANGHAI

TELEPHONE FOR AN APPOINTMENT TO CENTRAL 283.



Ryerson-Conradson Selective Head Engine Lathes

U. S. and Foreign Patents

The Ryerson-Conradson High Power Precision Selective Geared Head Engine Lathes can be employed for quantity production as well as general machine shop work. We are manufacturing these lathes in five sizes, 15″, 18″, 22″, 27″, and 33″ swing with any length of bed arranged for single pulley or constant speed motor drive equipped with mechanical spindle reverse.

Special Features in the Design, Construction and Operation

Head stock cast integral with bed.
Splash oiling system. (All gears running in bath of oil.)
Extra large spindle and spindle bearings. (27″ lathe front spindle bearing, 6¾″ x 10″. Hole through spindle, 4¼″.)
Herringbone gear drive to spindle.
Exceptional speed range. (12 speeds, 28 feeds.)
All gears permanently in mesh.
All operations controlled from apron.
Ways have large bearing surface and are of new design.
Special design of apron feed mechanism.
Weight commensurate with liberal size of all parts.

We manufacture a complete line of machinery, comprising everything for the boiler, structural, bridge, railway, and general machine shop, such as Friction Saws, Punches, Shears, Riveters, Bending Rolls, Lathes, Planers, Shapers, Millers, Drill Presses, etc.

A bulletin on any particular machine or a complete catalogue on all Ryerson Machinery will be mailed at your request.

Joseph T. Ryerson & Son

ESTABLISHED 1842 INCORPORATED 1888

NEW YORK
BUFFALO

CHICAGO, ILL., U. S. A.

ST. LOUIS
DETROIT

Cable Address: Ryson, Chicago. Telegraphic Codes: Bentley's, Western Union (5 Letter and Universal Editions), Lieber's, A. B. C. (5th Edition), Ryerson.

RYERSON

TRADE MARK
S

CABLE ADDRESS: "SUGAR," TOKYO
CODE: A.B.C. 5TH EDITION
Head Office:
No. 12 Sanchome, Kakigara-Cho,
Nihonbashi-Ku, TOKYO

RAW SUGAR REFINED

THE JAPAN SUGAR CO., LTD.
(DAI NIPPON SEITO KABUSHIKI KAISHA)
CAPITAL: YEN 18,000,000; PAID-UP: YEN 12,000,000

TRADE MARK
S

J. WHITTALL & CO., LTD.

TIENTSIN — ENGINEERS AND MERCHANTS SPECIALISTS IN — PEKING

MINING, RAILWAY AND TEXTILE MACHINERY

Agents in North China for:

HADFIELDS, LTD.
Mining and Light Railway Material of all Kinds

BELLIS & MORCOM, LTD.
Engines, Turbines, Condensers and Air Compressors

CROMPTON & COMPANY, LTD.
Electrical Generators and Motors

JOHNSON & PHILLIPS, LTD.
Electrical Cables and Transformers

M. B. WILD & COMPANY, LTD.
Winding and Hauling Machinery

HOWARD & BULLOUGH, LTD.
Textile Machinery and Cotton Mill Accessories

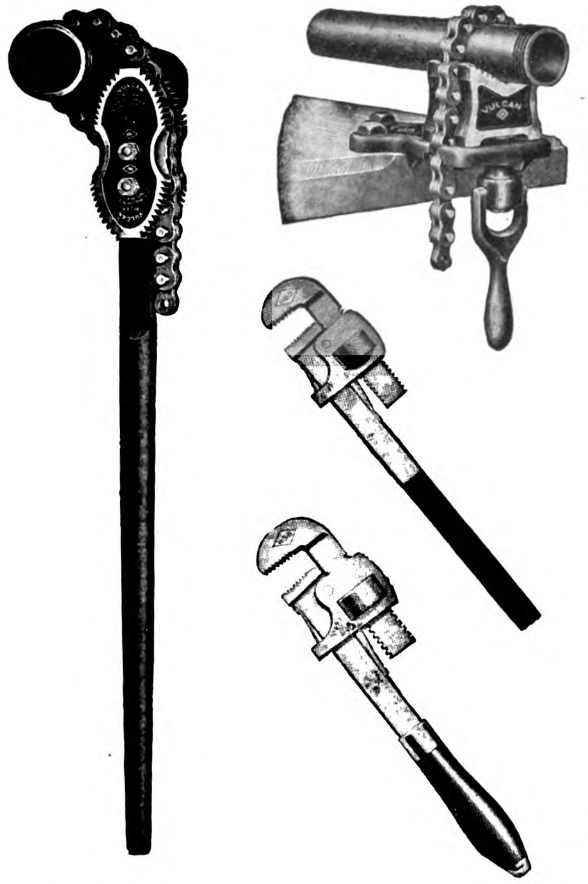
WARRINGTON WIRE ROPE WORKS, LTD.
Steel Wire Ropes

JOSEPH EVANS & SONS, LTD.
Mining Pumps

LEWIS BERGER & SONS, LTD.
Paints

Codes : Engineering 2nd Ed. A.B.C., 5th Ed. Bentley's: Kendall's: Scholfields: Private

Telegrams: "*Whittal.*"



Better Tools
Make Better Workmen—

You can't buy better Pipe Tools than WILLIAMS' Drop-Forged Wrenches and Vises :

Improved "Vulcan" Chain Pipe Wrenches
8 Sizes for 1/8 to 18 inch pipe.

"Vulcan" Vises 3 Sizes for 1/8 to 8 inch pipe.

Williams' Stillson Pipe Wrenches
Wood and Steel Handle 8 Sizes, 6 to 48 inches

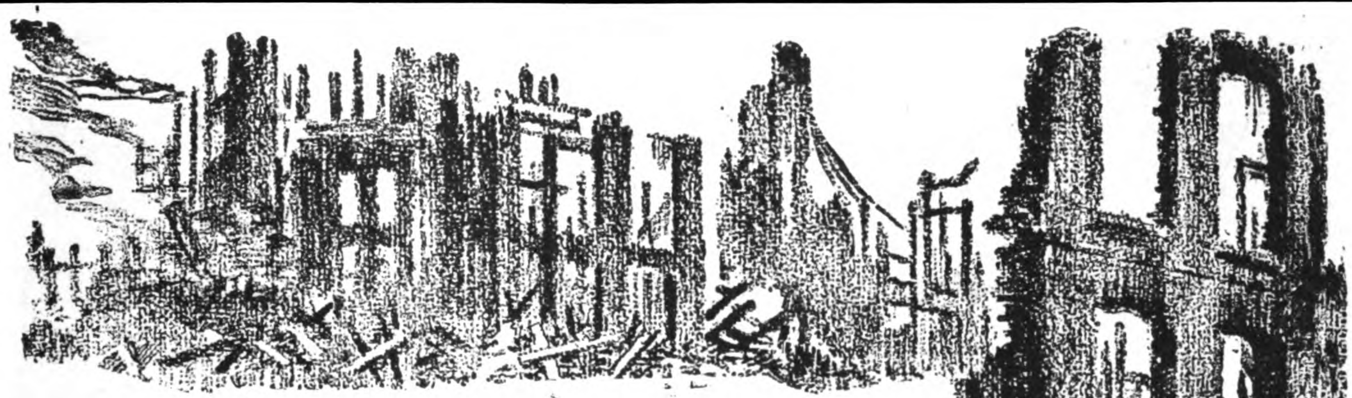
J. H. WILLIAMS & CO.

"The Drop-Forging People"

Export Office :
124 State Street,
New York, U.S.A.

London Representative :
Benj. Whittaker, Ltd.,
Department K.
56 Ludgate Hill, E. C. 4

General Offices :
124 Richards Street,
Brooklyn, N. Y., U.S.A.



Insurance doesn't prevent fires-

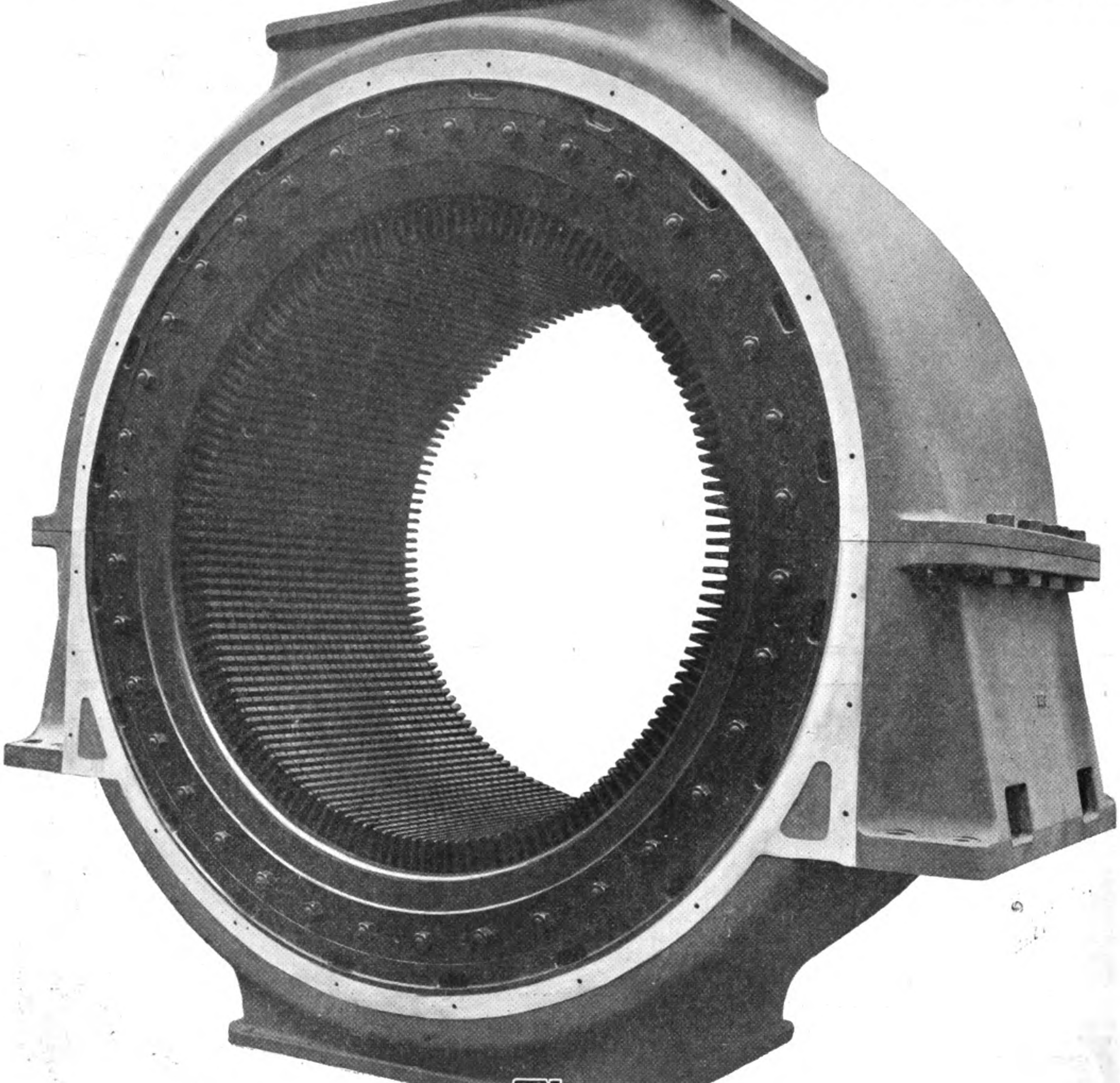
but a sure means of preventing fire damage is the

GRINNELL
AUTOMATIC SPRINKLER
AND FIRE ALARM

A small fire itself sets into operation the apparatus which extinguishes it and sounds the warning—it *cannot* grow into a big fire.

MATHER & PLATT, Ltd., MANCHESTER & LONDON.
47 SZECHUEN ROAD, SHANGHAI

10,000 H.P.
WATER DRIVEN ALTERNATOR



The

ENGLISH ELECTRIC
Company Limited.

WORKS:-

DICK, KERR WORKS, PRESTON. ORDNANCE WORKS, COVENTRY.
PHŒNIX WORKS, BRADFORD. SIEMENS WORKS, STAFFORD.
WILLANS WORKS, RUGBY.

HEAD OFFICE:-

Queen's House, Kingsway, London, W.C. 2.

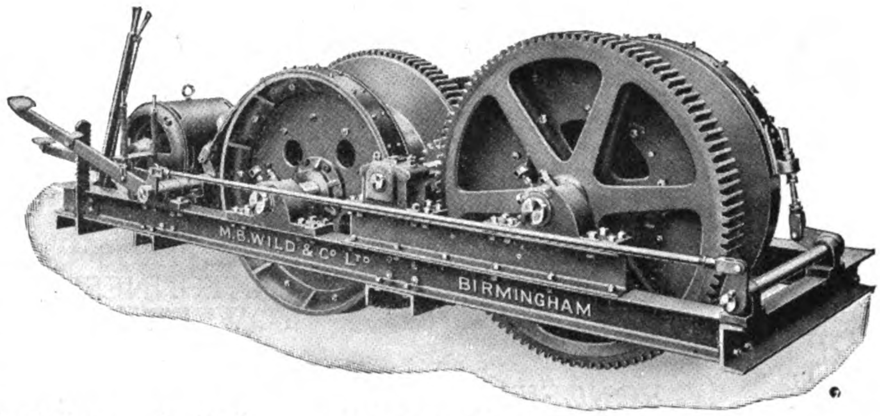
TELEPHONE — — — — — — — — — — — — — — HOLBORN, 830.

China Office: JARDINE, MATHESON & CO., LTD., Engineering Dept., 8a Yuen-Ming-Yuen Road, Shanghai
Japan Office: ENGLISH ELECTRIC CO., LTD., 3 Itchome, Uchisaiwaicho, Kojimachi-Ku, Tokyo

ELECTRIC HAULAGE MACHINERY

REGISTERED TRADE MARK

WE have been specialising on this class of machinery continuously for 20 years and have gained a large number of satisfied customers. Repeat orders have been received from many. Immediate delivery is offered of our Standard Haulages up to 100 h.p. and a Price List will be sent upon application.



Enquiries for particular requirements carefully studied and designs submitted.

15 H.P. Double Drum-Tandem Haulage

M. B. WILD & CO., LTD., BIRMINGHAM., ENGLAND

AGENTS:

J. WHITTALL & CO., LTD.

SHANGHAI TIENTSIN PEKING

TEL. ADD.: "WHITTALL" TIENTSIN
14, 16 & 18 VICTORIA TERRACE,
TIENTSIN

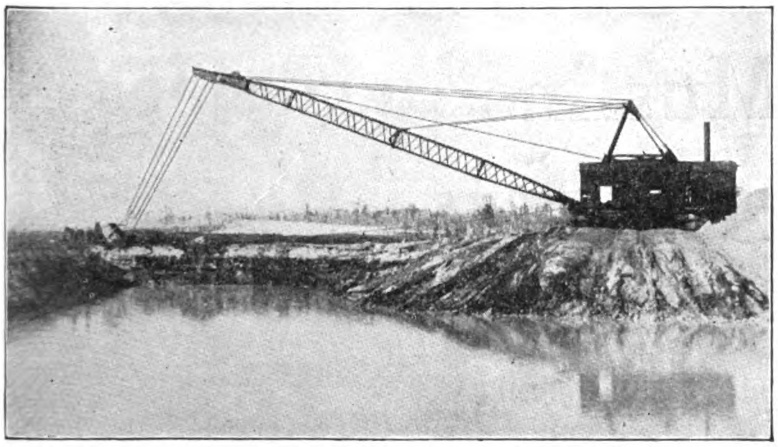
TEL. ADD.: "WHITSHANG" SHANGHAI
KELLY & WALSH BLDG.,
SHANGHAI

TEL. ADD.: "WHITTALL" PEKING
32 TA JUAN FU HUTUNG,
PEKING

BUCYRUS

TRADE-MARK Registered

DRAG-LINE EXCAVATING MACHINERY



This dragline is digging at a spot 300 feet distant from the dumping pile

If you are interested in irrigation or drainage work, it will pay you to investigate Bucyrus dragline excavators.

40 years of experience in building excavating machinery are incorporated in our steam and electric shovels, dragline excavators, dipper, hydraulic and placer dredges.

BUCYRUS COMPANY

South Milwaukee, Wisconsin, U.S.A.

Cable Address: "BUCYRUS, SOUTH MILWAUKEE"

London Office: BUCYRUS COMPANY, 19, Iddesleigh House, Caxton Street, Westminster.

Agents in Siam: D. Couper-Johnston & Co., Bangkok, Siam.

Agents in India: McLeod & Co., Calcutta and Bombay, India.

Agents in Malay States: The Borneo Company, Ltd., Singapore, S.S.

TRIMO WRENCHES

Pipe Wrench

Supplied with steel frames that do not break, nut guards that keep the adjusting nut from being turned accidently in close quarters, and inserted jaws in end of handle that can be removed when worn, saving the handle.

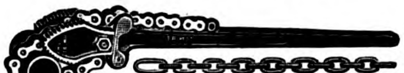
There are other superior points that every user of Trimo Pipe Wrenches knows—all for economy to the user.

Nut Wrench

Trimo Pipe Cutter

As a 1 or 3 Wheel Cutter

Trimo Chain Wrench



WITH FLAT-LINK OR CABLE CHAIN

TRIMONT MFG. CO.,

Roxbury (Boston), Mass.

JAPANESE
TEXTILES
FOR EXPORT

Standard Printed and Dyed Cotton and Silk Fabrics

SHIRTINGS SHEETINGS DRILLS
PRINTS CRETONNES FLANNELETTES
DAMASKS TOWELING CREPES
ETC. ETC.

PONGEES BROCADES SATINS
CREPES SILKS

FUJI GASSED SPINNING COMPANY, LIMITED

(FUJI GASU BOSEKI KABUSHIKI KAISHA)

Head Office:
GOCHOME, OSHIMA-MACHI
NEAR TOKYO
CABLE ADDRESS: "FUHO"

CAPITAL - Yen 38,000,000
OPERATING
450,000 Spindles and
1,775 Looms

Business Office:
SHICHOME, HAKOZAKI-CHO,
NIHONBASHI-KU,
TOKYO

Silks, Crepes, Brocades, Cotton Cloths, Muslins

SILK AND COTTON YARNS, NOILS, etc.

OUR EXPORT DEPARTMENT
IS REPRESENTED IN ALL THE IMPORTANT
COMMERCIAL CENTERS OF THE WORLD AND
CAN FURNISH PROMPTLY FULL INFORMATION
AND QUOTATIONS REGARDING THE LARGE
VARIETY OF TEXTILES MADE IN OUR MILLS

KANEGAFUCHI SPINNING COMPANY, LIMITED

HIGASHI-SHIRIIKE, KOBE, JAPAN

AVERY

PROPELLER BALANCER

No. 540

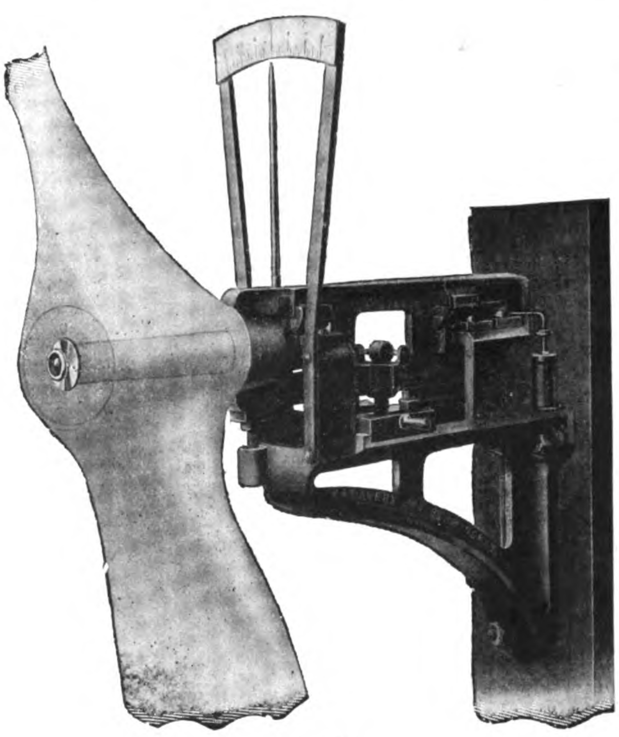
OWING TO THE HIGH SPEED OF ROTATION TO WHICH PROPELLERS ARE SUBJECTED, THE BLADES MUST BE ACCURATELY BALANCED. ANY SLIGHT EXCESS OF WEIGHT IN EITHER OF THE BLADES WILL PRODUCE AN UNBALANCED CENTRIFUGAL FORCE, CAUSING VIBRATIONS.

THE APPARATUS CONSISTS OF A BEAM FITTED WITH KNIFE-EDGES RESTING IN STEEL BEARINGS. AN ACCURATELY TURNED SPINDLE IS ARRANGED TO BE AXIALLY IN LINE WITH THE KNIFE-EDGES, AND A LOOSE GUN METAL SLEEVE TURNED TO SUIT THE PROPELLER IS FITTED OVER THIS.

THE PROPELLER TO BE TESTED IS THREADED ON TO THE SLEEVE AND SET TO DIFFERENT ANGLES, SO AS TO DETERMINE THE AMOUNT OF UNBALANCE. THIS IS SHOWN UPON THE GRADUATED QUADRANT, AND INDICATES THE AMOUNT OF MATERIAL TO BE REMOVED.

WRITE FOR LIST NO. L2 TO-DAY TO—

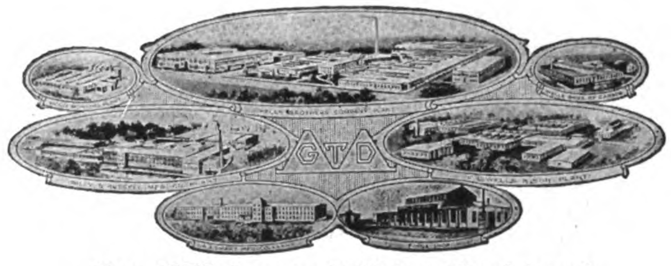
W. & T. AVERY LTD
SOHO FOUNDRY
BIRMINGHAM, ENGLAND.



No. 540
Avery Propeller Balancer

Ad. 607

You need these tools from GTD



Plants of GTD Corporation, World's Largest Manufacturers of Screw-threading Tools

1

2

1 The GTD Opening Die Stock is a hand tool which cuts an unusually accurate thread and requires slight effort to operate. After the thread is cut the die may be released, and pulled straight off the work. No time wasted in unwinding. Furnished to cut either Whitworth or USS threads.

2 *"Little Giant"* screw-plates contain assortments of tools for cutting screw-threads by hand:—taps, dies, die stocks and tap wrenches. Made by GTD in assortments suitable for every threading need. Look for the brand names, *"Little Giant," "O. K.," "Lightning"* and *Green River"* on screw-plates.

3 No. 490 GTD Adjustable Reamer can be adjusted to cut larger or smaller than normal. A very necessary tool for fitting tight pulleys, gears, etc. GTD makes an excellent line of reamers for all purposes including hand, expansion, taper, special Ford car reamers, repairman's taper reamer, etc.

WE invite you to send for booklets and catalogs descriptive of our tools. We will be pleased to place at your service our nearly fifty years of experience in making fine tools if you will fill out the coupon and mail it in. We will supply you with the latest information concerning the tools indicated, and place your name on our mailing list to receive additional information as issued.

3

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASS., U.S.A.

Canadian Plant: Greenfield Tap & Die Corporation of Canada, Limited, Galt, Ontario.
Cable address: "Getede"

GTD Corporation Greenfield, Mass. U. S. A.

Please send me catalogs and booklets descriptive of the tools I have checked, and add our name to your permanent mailing list for further information as issued.

☐ Production Threading Tools
☐ Repair Threading Tools

Name Position
Firm
Address F.E.R. 919

Horne Company, Ltd.
6-7 Takayama-Cho, Kyobashi-Ku
Tokyo, Japan

Muller, Phipps & Sellers, Ltd.
17 Itachibori Kitadori
5-chome, Nishi-Ku
Osaka, Japan

Fudo Bank Bldg., 9.2-chome
Honkokucho, Nihonbashiku
Tokyo, Japan

Muller & Phipps (Asia) Ltd.
P. O. Box 25, Prince's Bldg.,
Hongkong

Muller & Phipps (China), Ltd.
1B Jinkee Road
Shanghai, China

Dodge & Seymour (China) Ltd.
18 Museum Road
Shanghai, China

Jardine, Matheson & Co., Ltd.

CANTON HANKOW ICHANG TIENTSIN
CHENGTU HARBIN PEKING TSINGTAO
CHUNGKING HONGKONG SHANGHAI ETC.

Engineering Show Room: 8A YUEN-MING-YUEN ROAD, SHANGHAI

Sole Agents for Associated British Machine Tool Makers, Limited.

Comprising the following Firms:—

JAMES ARCHDALE & CO., LTD, Birmingham.
WILLIAM ASQUITH, LTD., Halifax.
J. BUTLER & CO., Halifax.
THE CHURCHILL MACHINE CO., LTD., Manchester.
DEAN, SMITH & GRACE (1908), LTD., Keighley.
KENDALL & GENT, LTD., Manchester.
JOHN LANG & SONS, LTD., Johnstone, Glasgow.
J. PARKINSON & SON, Shipley.
GEO. RICHARDS & CO., LTD., Broadheath, Manchester.
THOMAS SHANKS & CO., Johnstone, Glasgow.
SMITH & COVENTRY, LTD., Manchester.
H. W. WARD & CO., LTD., Birmingham.

The full range of Machine Tools manufactured by this combination is as follows:

LATHES

Sliding Surfacing and Screwcutting Lathes, Plain Lathes, High Speed Lathes, Axle Lathes, Toolroom Lathes, Surfacing and Boring Lathes, Vertical Boring Lathes, Cutting-off Lathes, Heavy Forge Lathes, Gun Lathes, Shafting Lathes, Break Lathes, Wheel Lathes, Relieving Lathes, Capstan, Turret and Brassfinishers Lathes of all types. Chucks and Self-opening Dieheads.

DRILLING MACHINES

Radial Vertical Drills of all sizes. Girder, Portable and Multiple-spindle Radials, Pipe-flange Drilling and Facing Machines, Ball-bearing Sensitive Multiple Drills and High-speed Drilling Machines.

MILLING MACHINES

Plain, Vertical, Horizontal and Universal Milling Machines, Plano-Milling Machines, Keyway and Slot Drilling Machines, Thread Milling Machines.

PLANING AND SHAPING MACHINES

Planing Machines in all sizes, Armour-plate Planing Machines, Pillar and Traversing Head Type Shaping Machines, Spiral Bevel Gear Planers, Side Planing Machines, etc.

BORING MACHINES

Horizontal Boring Machines, Special Boring Mills for Turbine Casings, Tyre Boring Machines.

GRINDING MACHINES

Twist Drill Grinding Machines, Cylindrical Grinders, Crank Shaft Grinders, Cam Grinders, Universal Chucking Grinders, Internal Grinders, Piston Ring Grinders, Wet Tool Grinders, Cutter Grinders, etc.

SLOTTING MACHINES

All types including High Speed and Portable Slotting Machines.

MISCELLANEOUS

Cutting-off Machines, Bolt Screwing Machines, Gun-boring, Lapping and Rifling Machines, Centring and Facing Machines, Nut Facing Machines, Universal Sharpening Machines, Mandrel Presses, Sand Blasts, Air Compressors, Broaching Machines, Twist Drills and Vices of all kinds.

ENQUIRIES SOLICITED

TUBES

IRON, STEEL, BLACK, GALVANISED

BOILER TUBES

Gas Water and Steam Tubes and Fittings
Boring & Casing Tubes
Tubular Coils for Heating and other Purposes.

STC

Sole Licensees in Great Britain for the Manufacture of

"ARMCO" Rust and Corrosion Resisting Iron Tubes

Write for Descriptive Pamphlet

THE SCOTTISH TUBE CO., LTD.

Head Office: 34 Robertson Street, GLASGOW.

Branch Offices—London, Manchester, Leeds, Liverpool, Newcastle-on-Tyne, Cardiff, Sydney, N.S.W.; Wellington, N.Z., Johannesburg, Cape Town and Durban, S.A.

Works—Glasgow, Govan, Coatbridge, Rutherglen and Garnkirk.

Telegraphic Address: "Scotubeco" Glasgow. Codes: A1, A.B.C. (4th & 5th Editions), Lieber's, Bentley's, Western Union and Private.

The Pneumercator Tank-Gauge

(PATENTED)

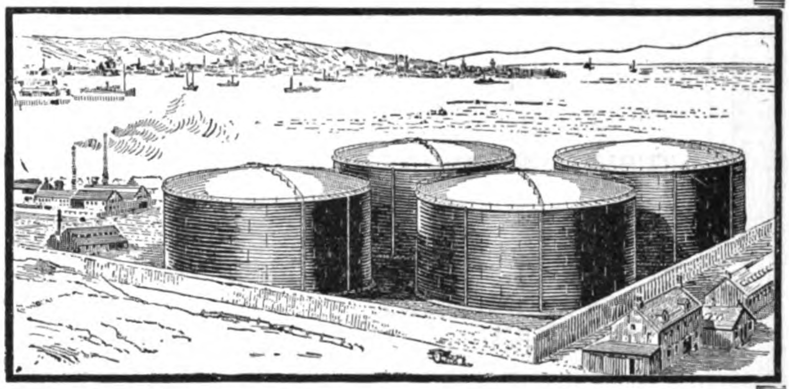
Measures and Weighs

FUEL OIL

or Any Liquid,
in Any Tank,
at Any Distance

Unaffected by
Changes of
Temperature.

NO FIRE RISKS.



WRITE FOR DESCRIPTIVE BOOKLET.

Sole Manufacturers for GREAT BRITAIN and EUROPE, INDIA, CHINA, AUSTRALIA, NEW ZEALAND, SOUTH AFRICA, ARGENTINE REPUBLIC, CHILE

KELVIN BOTTOMLEY & BAIRD LTD

MANUFACTURERS OF THE LATE LORD KELVIN'S INVENTIONS AND OTHER INSTRUMENTS

18 CAMBRIDGE ST. GLASGOW

Consolidated Steel Corporation

25 Broadway, New York, U.S.A.

SHANGHAI OFFICE : GLEN LINE BUILDING, 1-A PEKING ROAD, SHANGHAI
TOKYO OFFICE : JAPAN OIL COMPANY BUILDING, NO. 1 YURAKUCHO
ITCHOME, MARUNOUCHI, TOKYO.
CALCUTTA OFFICE : 6 HASTINGS STREET
BRANCH OFFICES AND REPRESENTATIVES IN PRINCIPAL COUNTRIES THROUGHOUT THE WORLD

CABLE ADDRESS: CONSTECO, NEW YORK

Cable Codes: Consolidated Steel Corporation, Western Union, A B C Fifth Edition Improved, Scott's 10th Edition, Bentley's Complete Phrase, Lieber's

SOLE EXPORTER OF THE COMMERCIAL PRODUCTS OF

BETHLEHEM STEEL COMPANY
BRIER HILL STEEL COMPANY
CAMBRIA STEEL COMPANY
LACKAWANNA STEEL COMPANY
LUKENS STEEL COMPANY
MIDVALE STEEL & ORDNANCE COMPANY
REPUBLIC IRON & STEEL COMPANY
SHARON STEEL HOOP COMPANY
TRUMBULL STEEL COMPANY
WHITAKER-GLESSNER COMPANY
YOUNGSTOWN SHEET & TUBE CO.

CONSTECO

TRADE MARK

We invite and will give prompt attention to inquiries for all forms of iron and steel products, including the following:—

PIG IRON	Basic, Bessemer, Foundry, and Malleable.
SEMI-FINISHED STEEL	Ingots, Billets, Blooms, Slabs, Skelp and Sheet Bars.
RAILWAY MATERIAL	Rails with Complete Accessories; Standard, Girder, Guard and High T-Rails; Steam and Electric Railway Frog and Switch Material; Special Track Work, including Switch Stands. Tires, Steel Tired Wheels, Rolled Steel Wheels; Locomotive and Car Axles, Loose and Mounted; All Steel Passenger Cars; Open Freight and Tank Cars; Forged Steel Locomotive and Car Parts; High Speed and Carbon Tool Steels.
STRUCTURAL STEEL	For Bridges, Buildings, Cars, Locomotives, Ships, etc. Plates, Sheared and Universal Mill, for Tank, Boiler, Ship, Firebox, Steel Bottom, etc. Angles, both Standard and Bethlehem, Special Sections, Channels, Shapes and Beams. Piling—Consteco-Lackawanna Sheet Piling (manufactured by Lackawanna Steel Company). Bars—Merchant Steel, Reinforcing, Refined Iron, Double Refined Iron, Staybolt Iron, Tool Steel, etc. Fabricated Structural Steel for Bridges, Buildings, Towers and other Structures.
TUBULAR PRODUCTS	Boiler Tubes, Lapwelded, Open-Hearth Steel and Genuine Knobbled Charcoal Iron; English Standard Steel Tubes, Gas and Steam Weights; Black and Galvanized and Red Painted American Standard Full Weight Pipe, American Standard Extra Heavy Pipe, Black and Galvanized. Line Pipe, Drive Pipe, Drill Pipe, and Oilwell Tubing. Standard Lapwelded and Special California Casing, Rigid and Flexible Electric Conduit.
SHEET AND TIN MILL PRODUCTS	Galvanized, Flat and Corrugated Steel Sheets, Blue Annealed Sheets, Shovel Sheets, One Pass Cold Rolled Close Annealed Black Sheets, Enamelling Stock, Deep Drawing and Extra Deep Drawing Stock and Copper Bearing Sheets. Coke Tin Plate, Best Cokes, Full Finished Tin Mill Black, Taggers and Dairy Stock, Terne Plate.
WIRE PRODUCTS	Wire Rods of Bessemer and Basic Open Hearth Steel, both Low and High Carbon. Bright, Soft, Bright Hard Drawn, Black Annealed, Galvanized, and Coppered Round Steel Wire. Galvanized Barbed Wire, Galvanized Staples, Wire Nails, etc.
FLAT STEEL PRODUCTS	Hoops, Bands, Hot Rolled Strip, Cold Rolled Strip.
SPECIAL PRODUCTS	Forgings, Castings, Toolsteel, Alloy Steels, Special Steels, Circular Sections, etc.
BOLTS AND NUTS	Rivets, Track Bolts, Spikes, Turnbuckles and Washers.
MACHINERY	Machine Tools, Planers, Horizontal Boring Machines, Hydraulic Presses Complete, Pumps and Pumping Engines, Railway Shop Machinery, Shipyard Machinery, Rolling Mill Machinery and Equipment, and any other Special Machinery Designed to order.

CANADIAN CARBIDE GIVES MORE GAS PER POUND

AND GAS IS WHAT YOU ARE BUYING

Export Drum with Wood over Cask

Years of manufacturing experience, plus facilities for quantity production assure highest gas yield and moderate prices.

CANADA CARBIDE CO., LTD.

Power Building, MONTREAL, CANADA.

Manufacturers and Exporters of

"S" BRAND HIGH-GRADE CARBIDE OF CALCIUM

Cable Address: CARBIDE, Montreal, Canada

Western Union, Bentley's and A.B.C. 5th Edition Codes.

Through America

via

The Milwaukee Railway

(*The Puget Sound Electric Route*)

A short, quick, and most comfortable route across the American Continent over the

World's Longest Electrified Railroad

For 649 miles over four mountain ranges mighty electric locomotives, using "White Coal" for power haul the splendidly equipped all-steel transcontinental trains

"The Olympian"* and *"The Columbian"

from Seattle and Tacoma daily for Spokane, Butte, Minneapolis, St. Paul, Milwaukee and Chicago.

"The Pacific Limited"

from San Francisco to Chicago via Southern Pacific, Union Pacific and Milwaukee Railways.

At Chicago connections are made with fast express trains for the Atlantic Seaboard and all points east.

Rail orders and full information respecting train schedules, connections, fares, etc., on application to your steamship agent or at any office of Thos. Cook & Son in the Orient.

For sleeping car reservations, write, cable or wireless any of the following representatives of the

Chicago, Milwaukee & St. Paul Railway

Cable Address: "Milwaukee"

Seattle—J. F. Bahl, City Passenger Agent, 2nd and Madison
San Francisco—C. H. Miles, General Agent Passenger Dept., 995 Monadnock Bldg.
Vancouver—Geo. W. Hibbard, General Agent, 626 Hastings St., West
Victoria—F. O. Finn, General Agent, 902 Government St.
A. P. Chapman, Jr., Ass't Gen'l Passenger Agt., 663 Stuart Bldg., Seattle
Geo. B. Haynes, General Passenger Agent, Chicago

IRON AND STEEL TUBES

for Gas, Water, Air, Steam, Oil, Sewage, Irrigation & other purposes

Black and Galvanized Tubes and Fittings.
Boiler Tubes · Weldless Steel Tubes · Boring Tubes.
Main Steam Pipe Installations.
Tubular Steel Tramway & Electric Light Poles.
Ashford's Patent Tube Well Strainers.
Steel Plates.——Steel Castings.

STEWARTS AND LLOYDS, LTD.

GLASGOW BIRMINGHAM LONDON

SHANGHAI OFFICE: 6 KIUKIANG ROAD

SALE & FRAZAR

S F

LIMITED

No. 1 Yayesucho, Kojimachi-Ku

TOKYO

Central Post Office Box No. 18

IMPORTS **EXPORTS**

Telegraphic Address: "FRAZAR"

Since 1834 The Name "FRAZAR" For All Offices has been Connected WITH

ORIENTAL TRADE

BRANCHES - - - - - Yokohama, Kobe, Osaka, Kyoto, Moji, Hakodate, Nagoya, Keijo (Korea), Taihoku (Formosa), Mukden (Manchuria), Vladivostok (Siberia.)

AFFILIATED COMPANIES -
FRAZAR & CO., 30 Church St., New York, and Paris, Seattle, San Francisco.
FRAZAR TRUST CO., LTD., Tokyo and Yokohama.
FRAZAR FOREIGN TRADE BUILDING CO., New York.

CORRESPONDENTS - - -
SALE & CO., 21 Old Broad St., London, E.C.
F. G. SALE & SONS, 20 Bishops Gate, London, E.C.
E. W. FRAZAR & CO., 5 Rue de Paris, Tientsin and Peking, Harbin, Mukden.

WORLD-WIDE CONNECTIONS
EXCLUSIVE AGENCIES IN ALL LINES
LARGE STOCKS

A FEW OF OUR AGENCIES

MANY OTHER EXCLUSIVE AGENCIES

MOTORCARS, TRUCKS, TRACTORS, ETC. Ford Motor Co., Hupmobile Motor Car Corp., Franklin Motor Car Co., Armstrong Siddeley Co., Ltd., Rolls Royce Co., Ltd., The White Co. (Trucks), Splitdorf Electrical Co.
MACHINE TOOLS. Joseph T. Ryerson & Son, Giddings & Lewis Mfg. Co., Wm. Sellers & Co., Inc.
RAILWAY EQUIPMENT. Baldwin Locomotive Works, W. H. Miner, Griffin Wheel Co., Duff Mfg. Co.
AVIATION EQUIPMENT: Handley Page, Ltd.
BRITISH STEEL and STEEL PRODUCTS. Jonas and Colver, Ltd., Smith & Coventry, Ltd., Sheffield Twist Drill & Steel Co., Ltd., Chubb & Son's Lock & Safe Co., Ltd.
CANNING MACHINERY and EQUIPMENT. American Can Co., Adriance Machine Works, Anchor Cap & Closure Co., Burpee and Letson Ltd., Seeley Brothers.
CANNED SALMON and CRAB from Kamchatka.
Fairbanks Morse & Co. Stationary and Marine Engines. Motors, Pumps, Wind Mills, complete Power and Lighting Plants.
Chain Belt Co., "Rex" Concrete Mixers.
J. L. Mott Iron Works, Plumbing Fittings and Supplies.
Shepard Electric Crane & Hoist Co., Cranes and Hoists.
Armour & Co., Canned Meats and Fruits, Soaps, Toilet Articles.
The Carnation Milk Products Co., "Carnation Cream."
The Glidden Co., Paints, "Jap-a-lac" Auto Finishes, Cold Water Paints, Wood Stains.
The Duratex Co., "Duratex" Leather Substitute and Rubber Coated Top and Curtain Materials.
S. C. Johnson & Son, Floor Wax, Paste, Liquid, and Powder.
The Klein Manufacturing Co., Technical Paints "Metal Crete" Concrete Hardeners, Cement Coating.
The Tungsten Wire Works (Stockholm), Wires for Filaments.
The Victor Talking Machine Co., Machines and Records.
The Graphoscope Development Co., Projectors and Films.
The Victor Typewriter Co., Standard Typewriters.
The Corona Typewriter Co., Folding Typewriters.
The Rolex Watch Co., Ltd., "Rolex" Watches.
Simmons Hardware Co., "Keen Kutter" and "Oak Leaf" Brands of Tools and Cutlery.
The Gillette Safety Razor Co., "Gillete" Blades.
ROAD, EXCAVATING, POWER HOUSE, REFRIGERATING MACHINERY: STEEL and IRON PRODUCTS: "Gould" STORAGE BATTERIES.
RADIO APPARATUS, HEATING EQUIPMENT, FERTILIZERS, SAWN TIMBER CHEMICALS.
OUR SERVICE also covers BONDS and INVESTMENTS, FIRE and MARINE INSURANCE, SHIPPING, STORING, CHARTER, SALE and PURCHASE of STEAMERS.

INQUIRIES SOLICITED - If we cannot Supply your Requirements from Stock, we will be pleased to Recommend Local Alternatives or Advise Regarding Imports.

FIREPROOF
Ambler
Asbestos Corrugated Roofing

Made of selected asbestos fibres and the best hydraulic cement, compressed int) compact sheets under three thousand pounds pressure per square inch, Ambler Corrugated Roofing and siding cannot burn, rust, rot, split nor leak. Made in sheets twenty-seven and one-half inches wide with eleven complete corrugations, and in lengths of four, five, six, seven, eight, nine and ten feet to be applied directly on purlins with lead washers and either bolts or aluminium tie wires, furnished. This material is unaffected by heat or cold or climatic conditions. Send for our data sheets showing method of use. Address all inquiries to Export Department "B."

"Permanent as the Everlasting Hills"

NO PAINTING—NO REPAIRING

Manufactured by

Asbestos
Shingle, Slate & Sheathing
Company

Ambler, Penna., U.S.A.

Distributors
Wanted
throughout
the East

Cable Address: "IWASAKISAL-TOKYO"

Code Used: A. 1., A.B.C. 5th, Western Union, Bentley's Complete Phrase

MITSUBISHI SHOJI KAISHA, LTD.

(MITSUBISHI TRADING CO., LTD.)

Capital, fully paid-up - - - Y. 15,000,000

***Head Office*:**

MARUNOUCHI, TOKYO.

Importers and Exporters, Manufacturers, Commission Merchants, Brokers, Ship Owners.

EXPORTING:

Coal, Copper and all Other Descriptions of Metals, Minerals and Cereals, Chemicals, Oil, Paper, Glass, Canned Fish, Silk Goods, and General Oriental Products and Merchandise

---

IMPORTING:

Iron, Steel, Machinery, Machine Tools, Chemicals, and General Merchandise

---

ANNUAL PRODUCTION:

Electrolytic Copper Ingots	20,000	Tons
Pig Iron	100,000	,,
Steel	50,000	,,
Coal	3,500,000	,,

COLLIERIES:

Takashima, Ochi, Yoshinotani, Kishidake, Namazuta, Shinnew, Hojo, Kanada, Kamiyamada, Ashibetsu, Biba', O-Yubari, and Sakito

---

BRANCHES and AGENCIES:

Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

STEAMSHIP DEPARTMENT—KOBE

Fleet Owned	25,000	Tons	Gross
Chartered Steamers	12,000	,,	,,

Regular and Irregular Routes between home ports and Chinese and South Sea Islands Ports, etc.

MIIKE COAL

The Finest Steaming and Bunker Coals of the Far East are mined from the famed Miike, Tagawa, Yamano Sunakawa and Kawakami Collieries operated by the

MITSUI

MINING COMPANY, LTD.

HEAD OFFICE:
No. 1 Surugacho, Nihonbashi-Ku,
TOKYO, JAPAN

Capital - - Yen 100,000,000

Annual Coal Output is equal to one-quarter of Total Japanese Mines.

LEAD, SILVER, GOLD, ZINC, COPPER, SPELTER, SULPHUR, COKE, IRON, CHEMICALS and DYES

Are produced from the Company's, KAMIOKA, Lead, Silver and Zinc Mine; SANO, Copper and Zinc Mine; KUSHIKINO, Gold Mine; KONGO, Tungsten Mine; IWAONOBORI, Sulphur and Metal Mine; Zinc Plants, Coke, Dyestuffs and By-products Establishments in Miike.

***Sole Agents for our Products*:**

MITSUI BUSSAN KAISHA, Ltd.

(MITSUI & Co., Ltd.)

Tokyo, London, New York, Shanghai, Hongkong, and other Principal Commercial Centres of the World.

Contractors to: The Admiralty, The War Office, The India Office, The Crown Agents for the Colonies, Colonial and Foreign Governments

Internal Combustion Rail Cars, Inspection Cars, Coaches, Tramcars, Trailers, Locomotives, Tractors, etc.

British built throughout and supplied to upwards of 200 Railways in all Parts of the World

Designs to meet individual requirements

The Drewry Car Co., Ltd.

(and McEwan Pratt & Co., Ltd.)

13 South Place, London, E.C. 2

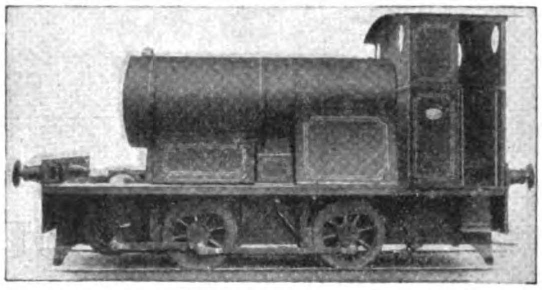
Telegrams: "Effervesce, London"

Works: Burton-on-Trent, England

Passenger
Freight
Shunting

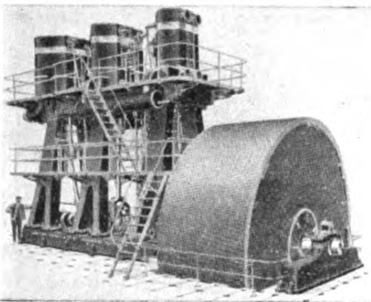
Mining
Harbours
Docks

Plantations
Logging
Contractors



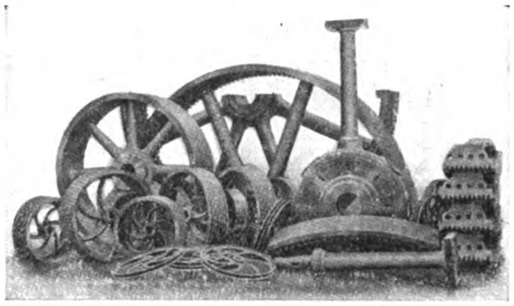
ASHTON FROST & CO., LTD.

ESTABLISHED 1873.



MAKERS OF

STEAM ENGINES,
MILL GEARING,
DEEP WELL PUMPS,
SEWAGE PLANT,
ETC.



TELEGRAMS: "FOUNDRY."

WORKS: **BLACKBURN, ENG.**

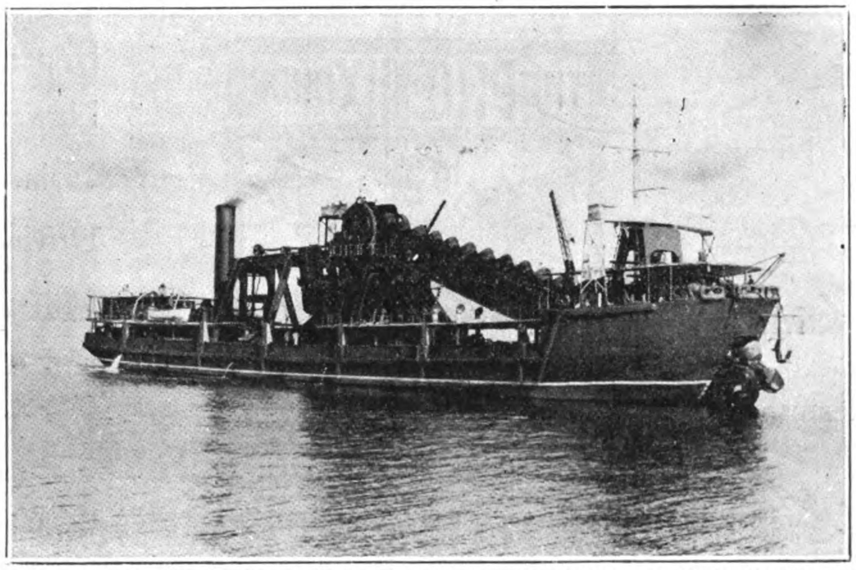
Wm. Simons & Co., Ltd., Renfrew

CONSTRUCTORS OF

Marine Dredging Plant

of most Modern and Improved Types and of the Greatest Capacities.

Constructors of Barge Loading, "Simons" Reclamation, Canal and Suction Cutter Hopper Dredgers. Hopper and Barge Loading Bucket Dredgers. Alluvial Dredgers. Trailing Suction Dredgers.



Twin Screw Bucket Ladder Hopper Dredger *Silurus*, Constructed to the Order of the Bombay Port Trust

Propelling and Dumb Hopper Barges.

Replace Parts supplied or fitted to existing Dredgers.

Inventors and First Constructors of "Hopper" and "Sternwell" Dredgers and Elevating Deck Ferry Steamers.

Head Office and Works: Renfrew, near Glasgow.

Telegrams: "Simons" Renfrew.

Established 1810

The Green Island Cement Co., Ltd.

SHEWAN, TOMES & CO.,

GENERAL MANAGERS, HONGKONG

Are You Going to Build?

Insist on your Architect specifying the use of the best brand of Portland cement in construction. If the house or factory is to be blocks or tiles, they should be of concrete, if stucco, only the best cement should be employed; if reinforced concrete is used, only a standard cement will stand the test; if your building is to be fireproof, waterproof, safe against earthquake or typhoon, improving with age, and lowering the cost of insurance, you must employ concrete, and the best concrete construction is only secured through the use of

Green Island Cement

Green Island Cement is supplied in Bags = 250-lbs. net, Casks = 375-lbs. net, Iron Drums = 375-lbs. net.

Also, Glazed Stoneware, House Drains, Sewer Pipes, and Fittings, Paving Bricks, Tiles, Fire Bricks and Fire Clay.

The Green Island Brand has become the standard Portland Cement of Asia, owing to its purity, uniformity and tests.

Used by H.B.M.'s Government in Hongkong, United States Government in the Philippines for all important Public Works.

Also by H.B.M.'s Government in Singapore and Federated Malay States for Government Buildings, Railways and Harbour Works.

Established 1883 Telegraphic Address "ROPEWORK," HONGKONG

THE HONGKONG ROPE MANUFACTURING Co., Ltd.

Manufacturers of Pure Manila Hemp Rope

Rope supplied to the British Navy on the China Station and to all Mail and regular Steamship Lines.

Ropes, Cables and Hawsers ½-in. to 15-in. Circumference. Driving Ropes for Mills; Bull Ropes and Drilling Cables for Oil Wells a Specialty.

SHEWAN, TOMES & CO.

General Managers

St. George's Building HONGKONG.

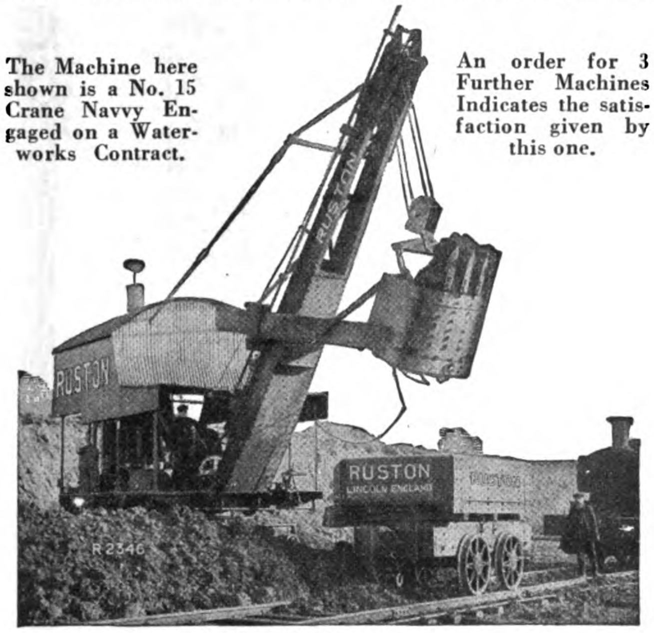
ECONOMICAL EXCAVATIONS

RUSTON EXCAVATORS—Crane Navvies Shovels, and Draglines have proved their efficiency on all classes of excavations in all parts of the world.

Wide Range of Machines available on Rail Wheels, Road Wheels or Caterpillar Tracks.

The Machine here shown is a No. 15 Crane Navvy Engaged on a Waterworks Contract.

An order for 3 Further Machines Indicates the satisfaction given by this one.



Full particulars from:—

RUSTON & HORNSBY LTD., LINCOLN, England.

OR

MARTIN & CO., CALCUTTA.
ARNHOLD BROTHERS & CO., LTD., SHANGHAI.
UNITED ENGINEERS LTD., SINGAPORE.

The JANNEY-PENN Coupler

THE latest development of the Janney type of M. C. B. Coupling originally introduced and promoted by this company. This coupler has all the simplicity of the early type of the Janney coupler, and also has the up-to-date features of a "Lock-to-the-Lock," "Lock-Set," and a "Knuckle-Opener," and complies fully with all the requirements and recommendations of the M. C. B. Association of the U. S. A.

This coupler has the desirable feature of easy accessibility of parts, thus facilitating the making of repairs.

Furnished with various designs of rear end to suit different types of Draft Rigging.

Manufactured exclusively by

THE McCONWAY & TORLEY CO.

Pittsburgh, Pa., U. S. A.

Cable Address—Torley, Pittsburgh

China Agents: The Fearon, Daniel Co., Tientsin, Peking, Hankow and Shanghai, China

FOR GASES CHARGED AT HIGH PRESSURES

Seamless Steel Cylinders

For oxygen, acetylene, hydrogen, carbonic acid, nitrous oxide, sulphur dioxide, liquid chlorine, blaugas, etc.

Furnished complete with or without caps and valves. Built strictly to British and American specifications, insuring absolute safety. Prompt shipments.

This company is a subsidiary of the Taylor-Wharton Iron & Steel Co., established 180 years ago, manufacturers of manganese steel rails, frogs, switches gears, rolls, dippers, buckets, crushing and mill machines, etc.

Its seamless steel cylinders are noted for their toughness and ductility, the caps and valves are carefully and accurately constructed, and in every respect they represent the highest quality of material and workmanship.

Representatives Desired

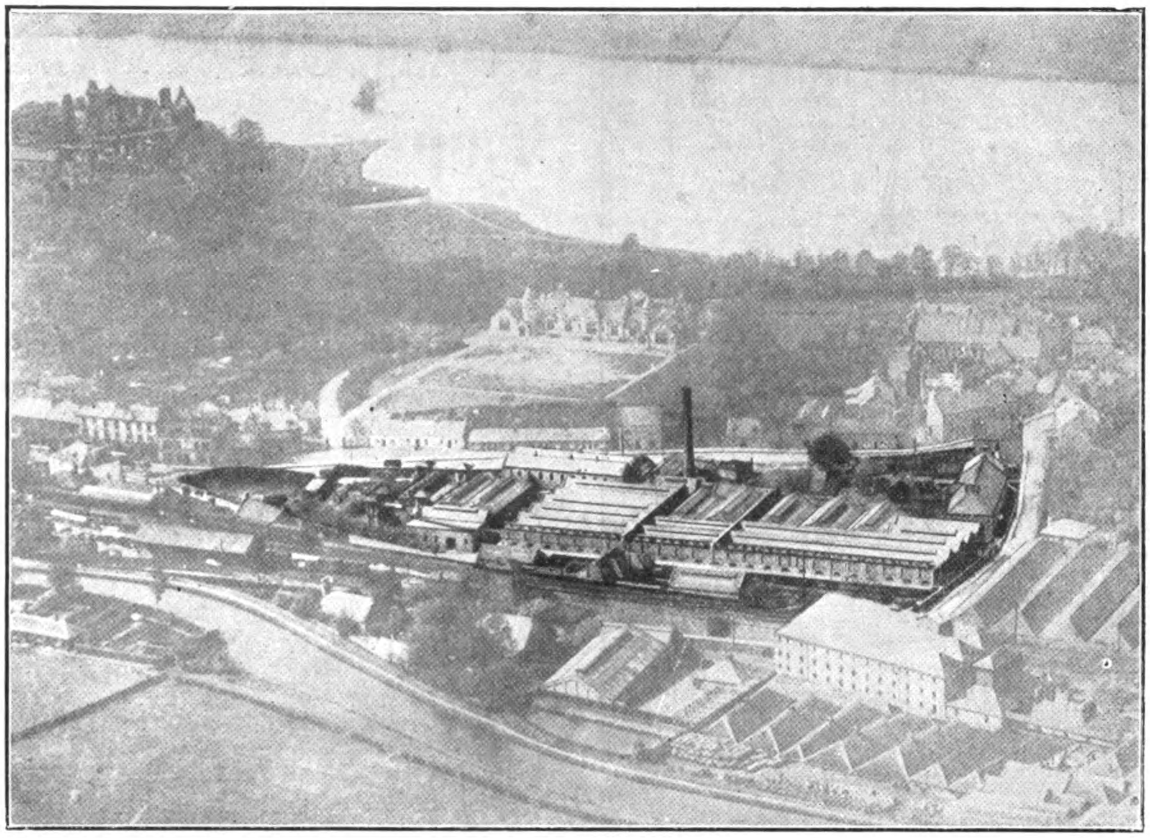
We desire to correspond with high-grade concerns and individuals in regard to representing us. Our facilities, in both manufacture and service, our reputation, stability and the worth of our products make the opportunity a desirable one. Please give full particulars.

Wm. Wharton, Jr. & Co., Inc.

(Founded 1859)

30 Church St., New York, U. S. A.

Cable, Wilwharton, New York



FAMOUS FACTORIES NOBEL'S REGENT FACTORY

The above view shows one of the Safety Fuse Factories controlled by Nobel Industries Limited. This factory was built in 1902 by Nobel's Explosives Co. Ltd., in order that that company might have, in the industrial area of Scotland, a completely up to date factory for the manufacture of Safety Fuse to be used in conjunction with their Blasting Explosives.

The building was specially designed to reduce the possibilities of fire and accidents arising therefrom to a minimum. The site was chosen because of its favourable position for the distribution of fuse to collieries and overseas, being on the main line between Edinburgh and Glasgow.

The factory is situated in the town of Linlithgow, and it will be of interest to readers to note in the top left hand corner of the illustration the Palace of Linlithgow where Mary Queen of Scots was born. The name of the factory also has an historical connection because it was just here that the Regent Moray was assassinated in 1520.

The manufacture of Explosives is only a section of the industries covered by the organisation of Nobel Industries Limited. Other products include Metal and Hardware, Bicycles and Accessories, Incandescent Gas Mantles, Sporting and Military Ammunition and Powders, Industrial Collodions, etc., etc.

Enquiries should be addressed to:—

NOBEL INDUSTRIES LIMITED

Head Office:

NOBEL HOUSE, LONDON, S.W. 1.

Write to the Advertising Department, Nobel House, for illustrated booklet "The Products of Nobel Industries, Ltd." mentioning this Journal.

Agents for Explosives and Ammunition: Jardine, Matheson & Co., Ltd., Hongkong, Shanghai, Peking and Tientsin

UNITED STATES STEEL PRODUCTS COMPANY

30 Church St., New York, U.S.A.

Sole Exporters of the Products of

Carnegie Steel Company
Illinois Steel Company
American Steel & Wire Company
American Sheet & Tin Plate Company
The Lorain Steel Company
American Bridge Company
National Tube Company
Tennessee Coal, Iron & Railroad Company
Minnesota Steel Company
Canadian Steel Corporation
Chickasaw Shipbuilding and Car Company

BRANCH OFFICES and REPRESENTATIVES IN

Antwerp, Belgium
Birmingham, England
Bombay, India
Brussels, Belgium
Buenos Aires, Argentine Republic
Calcutta, India
Cape Town, South Africa
Christiania, Norway
Concepcion, Chile
Glasgow, Scotland
Havana, Cuba
Johannesburg, South Africa
Lima, Peru
Los Angeles, California
London, England
Mexico City, Mexico
Montreal, Canada
New Glasgow, Canada
New Orleans, La
Paris, France
Peking, China
Portland, Oregon
Rio de Janeiro, Brazil
Rome, Italy
Rotterdam, Holland
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Seattle, Washington
Soerabaya, Java
Sydney, New South Wales
Tokio, Japan
Toronto, Canada
Valparaiso, Chile
Vancouver, Canada
Winnipeg, Canada

WAREHOUSES AT

Antwerp, Belgium
Bombay, India
Buenos Aires, Argentine Republic
Calcutta, India
Callao, Peru
Cape Town, South Africa
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Talcahuano, Chile
Valparaiso, Chile

We give prompt attention to inquiries for all class of our Steel Products, including the following:—

Aerial Tramways—Reversible, specially designed
Alloy Steel
Alloy Steel Sheets
Ammonia Cylinders
Angles
Armatur Sheets
Axles—Locomotive, Railroad and Tramway Cars
Bamboo Steel
Barbed Wire
Bars—Steel, Concrete Reinforcement
Billets
Blacks Sheets
Blooms
Boiler Tubes, Lapwelded, Seamless
Bolts and Nuts
Bridges—Railway, Highway, specially designed
Buildings—Steel Warehouses, Structural Steel for Buildings
Cables—Steel Hoisting and Hauling Cables
Cars—Steam Railway, Mine and Industrial Railway Cars
Car Angles
Car Wheels
Circular Steel Poles
Cold Rolled Flat Wire
Copper Rail Bonds
Copper Steel Sheets
Derricks
Drilling Machines
Drilling Rigs for Oil Wells
Duquesne Rail Joints
Electrical Sheets
Electrical Wires and Cables
Fabricated Structural Material for Bridges, Turntables, Steel Buildings, etc.
Fencing Materials—Wire Fencing, Steel Posts
Forgings
Frogs and Switches—Steam and Electric Railways
Hoops and Bands
Machine Forgings
Mine Timbers
Nails and Spikes
Nail Wire
Pig Iron
Piling—Steel Sheet
Pipe—Black and Galvanized Wrought, for Steam, Gas and Water: American or English Lapwelded Boiler Tubes. Matheson Lead Joint Pipe. Seamless Steel Tubing
Plates—Boiler, Tank, Ship, Flange and Fire Box Steel
Poles—Steel Tubular
Rails—Light and Heavy Rails for Railways, Tramways, Mine and Industrial Railways. Special Track Work
Reinforcement for Concrete—Triangle Wire Mesh
Rivets
Rope—Wire for Mine Hoists, Derricks, Cranes, etc.
Screw Spikes
Screw Stock—Cold Drawn
Shafting
Shapes—Standard Structural
Sheet Bars
Sheets—"Apollo" Brand, Plain, Galvanized, Corrugated, Black
Skelp
Slabs
Spikes—Railway Track Spikes
Sleepers—Steel
Spring Steel
Steam Pipe and Tubes
Stove Pipe Skeebs
Switchs—Switch Stands
Tank Plates
Terne Plates
Tin Mill Products
Tin Plate—"Coke," "Charcoal" and "Terne"
Tool Steel
Towers—Steel
Triangle Mesh Concrete Reinforcement
Tubes—Gas, Water, Steam
Turntables for Light and Heavy Railway Service
Upholstery Springs
Washers
Weatherproof Insulated Telephone and Signal Wire
Wheels—Solid Wrought Steel for Steam, Electric, Mine and Industrial Railways
Wire Products—Plain, Galvanized, Bright Hard, Bright Soft, Baling and Fencing. All Classes of Coated and Uncoated for Manufacturing Purposes

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE: Union Building—The Bund and Canton Road
PEKING OFFICE: No. 22 Wu Liang Ta Jen Hutung
TOKYO OFFICE: No. 15 Nakadori, Marunouchi

OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President:
Baron K. Okura

BRANCHES at Hakodate, Yokosuka, Yokohama, Osaka, Kobe, Maizuru, Kure, Moji, Saseho, Keelung, Taihoku, Seoul, Antung, Penhsihu, Mukden, Tientsin, Peking, Hankow, Changsha, Kiukiang, Tsingtau, Hongkong, Vladivostok, Sydney, San Francisco, New York, London.

Head Office:
Ginza, Tokio

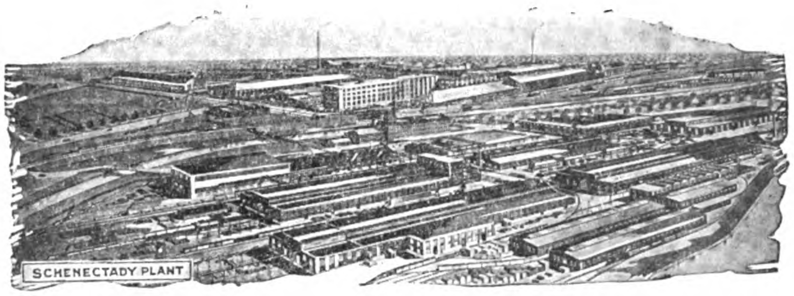
GENERAL IMPORTERS AND EXPORTERS

Rails, Bridges, Locomotives and other Railway Supplies
Electric Plants, Electrical Supplies
Sugar Plants, Spinning Machinery, Machine Tools
Factory Equipments, and all kinds of Machines
Automobiles, Guns and Explosives
Structural Materials, Steel Materials, Metals
Mineral Products, Chinese and Japanese Produce, Silk
Cotton, Wool, and their Manufactures
Fertilizers, Chemicals, Vegetable Oils and Wax, Dye Stuffs
Food Stuffs, Hides and Fur, Skins, Pen-hsi-fu Smokeless Coal and Pig Iron, etc.

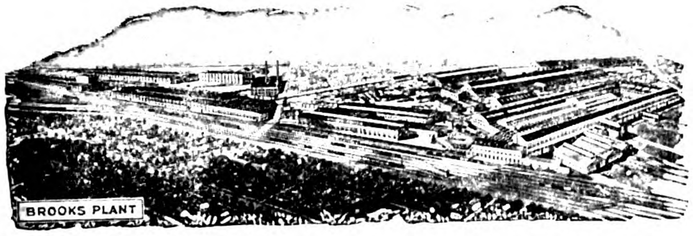
BUILDING AND CIVIL ENGINEERING CONTRACTORS,
INSURANCE AGENTS

Yih Chong Wharf (Okura)

POOTUNG, SHANGHAI



LOCOMOTIVES



Our organization is equipped to furnish every facility which long experience and abundant capital can provide for producing high-class work, and for conducting the business of manufacturing locomotives on the most economical basis to both purchaser and manufacturer.

American Locomotive Sales Corporation

New York City

Telegraphic Addresses :

Locomotive : Peking, China — Bamco : Sydney, Australia

Mitsui : Tokio, Japan — Nottac : Manila, P.I.

Dilpax : Honolulu, Hawaii

Cable Address: "MITSUI"

MITSUI BUSSAN KAISHA

LIMITED

Capital: Yen 100,000,000
Reserve: „ 30,000,000

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

IMPORTERS AND EXPORTERS

SHIPOWNERS AND SHIPBUILDERS

***Head Office*: TOKYO, JAPAN**

Branches:

HOME—Yokohama, Nagoya, Osaka, Kobe, Otaru, Muroran, Hakodate, Niigata, Moji, Wakamatsu, Kuchinotsu, Nagasaki, Karatsu, Miike, Taipeh, Keelung, Tainan, Takow, etc., etc.

ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soerabaya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc., etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc., etc.

IMPORT.

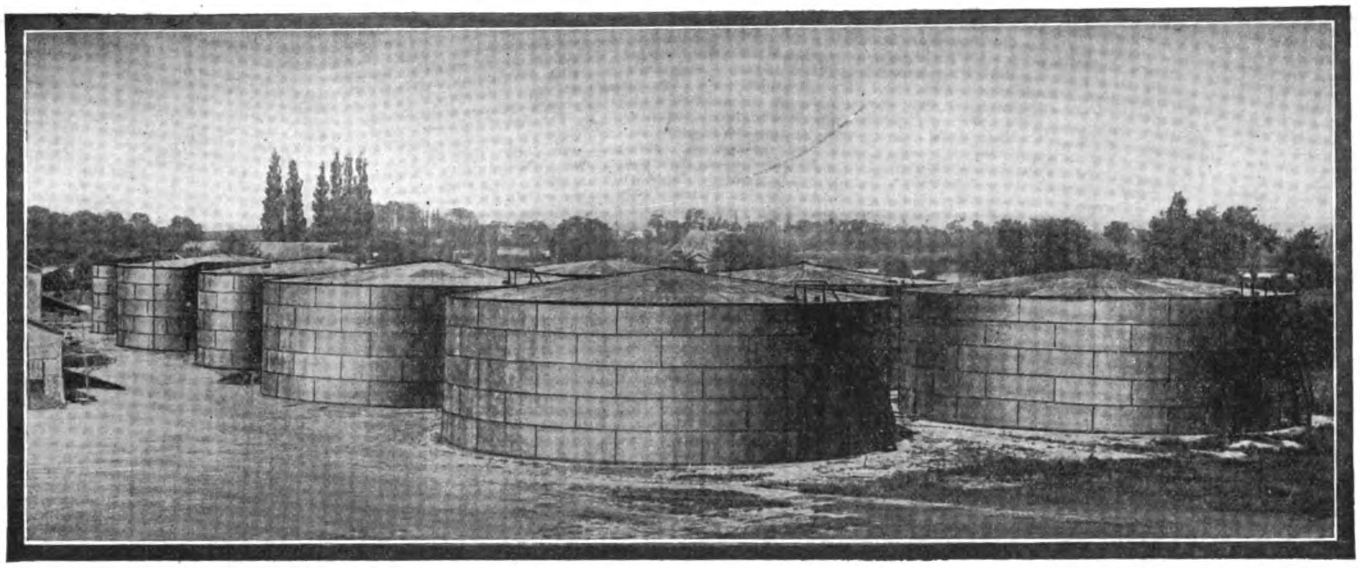
Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

ENGINEERING DEPARTMENT

Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Export Co.
Manning Maxwell & Moore, Inc.
Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc. etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



McClintic Marshall tanks used by G. M. Terracini, La Milleraye, France.

We Design, Manufacture and Erect
Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity, 400,000 Tons

It is false economy to purchase structural steelwork upon a price basis only. Investigate thoroughly the experience and scope of the manufacturer.

The more carefully you analyze, the more impressed you will be with the ability of the McClintic-Marshall organization. It is the result of more than twenty years' experience in designing, manufacturing and erecting steel structures of all kinds.

Write for Free Booklet 403

McClintic-Marshall Products Company

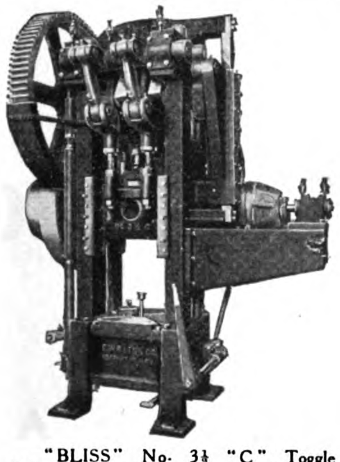
FACTORIES: PITTSBURGH, U. S. A.
Foreign Contract Dept: 50 Church Street, NEW YORK, U.S.A. Cable Address: "Macmarsh," NEW YORK.
YOKOHAMA: H. E. Root, 73 Yamashita-cho
LONDON: George A. Smith, St. Stephen's House, Westministe r, London, S.W. 1.
PARIS: Produits Métallurgiques McClintic-Marshall, 8 Rue Edouard VII
MADRID: Hispano-American Corporation. HAVANA: San Ignacio y Obrapia
Codes: Bentley's, General, Western Union Five Letter, Lieber Five Letter

McClintic-Marshall

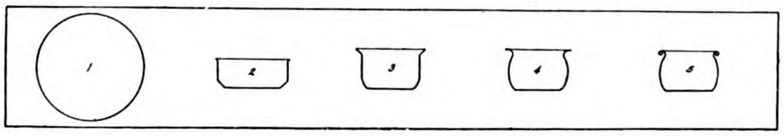
Steel Construction

MACHINERY for Manufacturing Tin Cans—Tin Ware—Metal Packages Cutlery—Hardware—Aluminum Ware and Enamel Ware—Electrical Equipment. Also Horseshoe—Minting and Drop Forging Machinery

1857 BLISS 1922



"BLISS" No. 3½ "C" Toggle Drawing Press, one of a large number of sizes built, adapted for drawing and re-drawing medium size work. It takes in a wide range of articles produced of sheet aluminum.



The illustration above shows the operations required in the production of many of the ordinary articles of Aluminum Ware. Operations are as follows: Cutting Blank, Drawing, Re-drawing, Spinning or Bulging, Trimming and Wiring. For the ordinary articles of Aluminum Ware, three machines, Blanking Press, or Circle Shear—Drawing Press—and Spinning, Trimming and Wiring Lathe, are required. However, a set of tools is necessary for each article to be produced.

We build machinery for the economical manufacture of any article produced from sheet aluminum, round, square or oval. To quote on the correct equipment necessary we must have drawings or samples of each article to be made and know daily production desired of each article.

" BLISS " on your machinery is more than a name; it is a guarantee.

E. W. BLISS CO. MAIN OFFICE AND WORKS **BROOKLYN, N. Y., U. S. A.**

American Factories: BROOKLYN, N.Y. HASTINGS, MICH. CLEVELAND, OHIO. SALEM, OHIO.

FOREIGN SALES OFFICES AND FACTORIES:

ENGLAND, Pocock St., Blackfriars Rd., S. E., London — ITALY, 345 Via Nizza, Turin — FRANCE, 54 Blvd. Victor-Hugo St. Ouen, Paris

FOREIGN REPRESENTATIVES:

INDIA	CHINA	JAPAN
Alkin and Duff Eng. Co., Clive Building, Calcutta	Allied Machinery Co. of America, Shanghai, Tientsin, Dairen, Manchuria	Horne Co., Ltd. Tokyo, Osaka

No. 241

Power Engineering

Textile Manufacturing Engineering

Electrical Supplies

Mechanical Equipment and Supplies

Railway Equipment and Supplies

Building Supplies

General Imports

Fire, Marine and Motor Car Insurance

Andersen, Meyer & Co., Ltd.

Sole Agents for China

Address inquiries to : SHANGHAI, MUKDEN, TIENTSIN, PEKING, TSINAN, HANKOW, CANTON or HONGKONG

STANDARD OIL COMPANY OF NEW YORK

26 Broadway New York

The Mark of Quality

SOCONY PRODUCTS

Illuminating Oils Lubricating Oils

Gasoline and Motor Spirits

Lamps, Stoves and Heaters

Road Oils and Material for Road Building

Paraffine Wax and Candles

BRANCH OFFICES IN PRINCIPAL CITIES OF

Japan	Siam	India
China	Philippine Islands	South Africa
Indo-China	Straits Settlements	The Levant
	Netherlands India	

THE

HONGKONG & WHAMPOA DOCK CO.

LIMITED,

HONGKONG

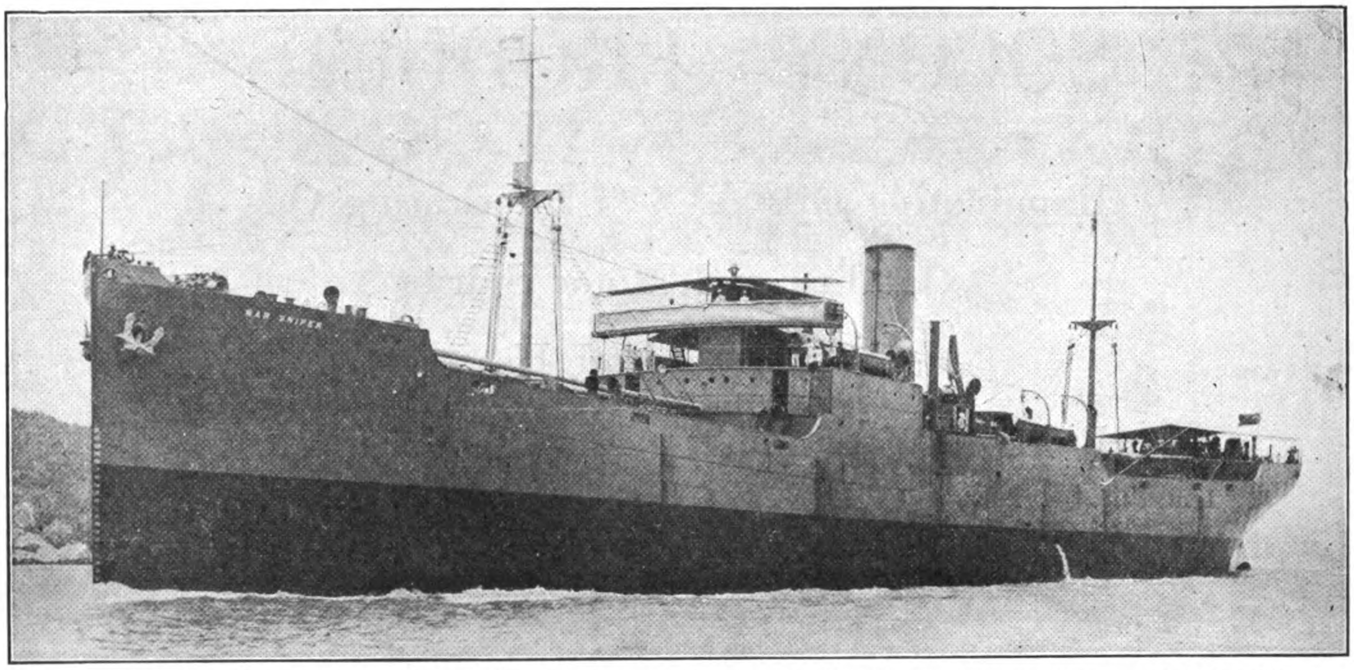
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

With Steel Plate or Cast Iron Frames

Agents for China:—

The Anglo-Chinese Engineers' Association, Ltd. in Association with Reiss & Co.

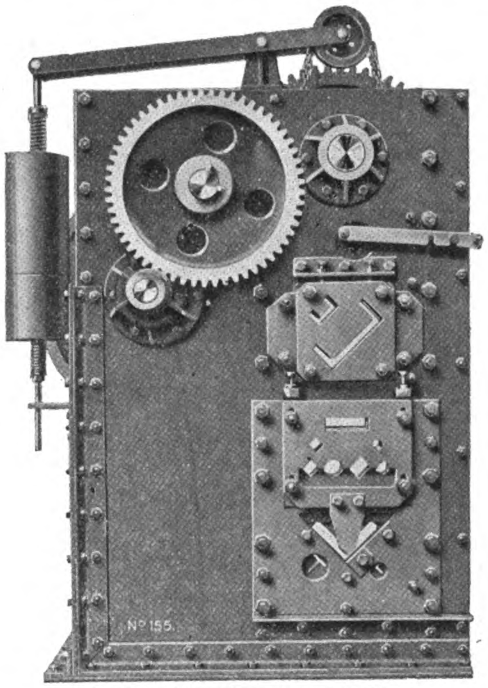
Address:—

Ice House St., Hongkong

7 Hankow Rd., Shanghai

Liddell Buildings, Yaku Road, Tientsin.

52 Dar Farng Chia Hutung, Peking.



Section Bar Cropping Machine

Punching and Shearing Machines.

Plate Bending Machines.

Plate Straightening Machines.

Plate Edge Planing Machines.

Plate Shearing Machines.

Steam Bending and Straightening Machines.

Bar Cropping Machines.

Multiple Punching Machines.

etc. etc.

CRAIG & DONALD LIMITED

Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LTD.

PATENT

WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES. AND FOR BURNING ANY KIND OF FUEL

13,400,000 H.P. Land-type For Stationary Purposes—**6,400,000 H.P.** Marine-type Afloat

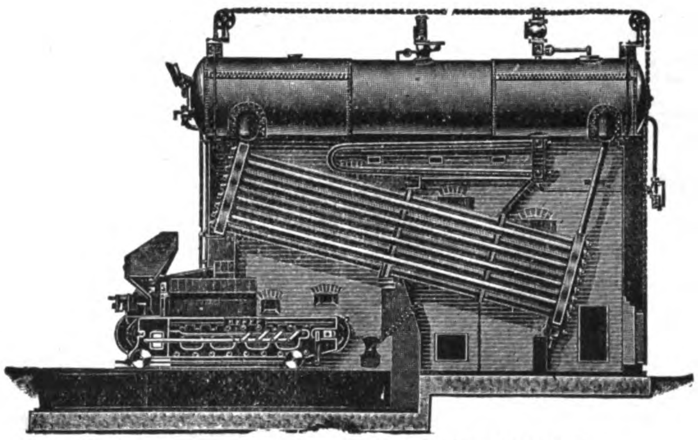
SUPERHEATERS

CHAIN GRATE STOKERS

ECONOMISER

FEED-WATER HEATERS

WATER SOFTENERS AND PURIFIERS



BABCOCK & WILCOX LAND BOILER, fitted with Patent Superheater and Chain Grate Stoker

COAL CONVEYORS

SUCTION ASH PLANTS

ELECTRIC CRANES

STEEL CHIMNEYS

STRUCTURAL STEEL WORK

WHITE-FORSTER WATER-TUBE MARINE STEAM BOILERS

THE BABCOCK & WILCOX STOKER, of which over 4,300 have been made, is now extensively used throughout the world for burning bituminous and smoky coal without the production of smoke. It is especially suitable in the case of Chinese and other coals, which contain a large percentage of ash, owing to the fact that the stoker is absolutely self-clinkering, and does not require to be touched with firing tools. It is the only mechanical grate which, after extensive trials, has proved to be an unqualified success in burning bituminous coal efficiently and smokelessly.

HEAD OFFICE FOR CHINA: 1 THE BUND, SHANGHAI

" " " JAPAN: I. I-CHOME, YURAKU-CHO, KOJIMACHIKU, TOKYO.

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

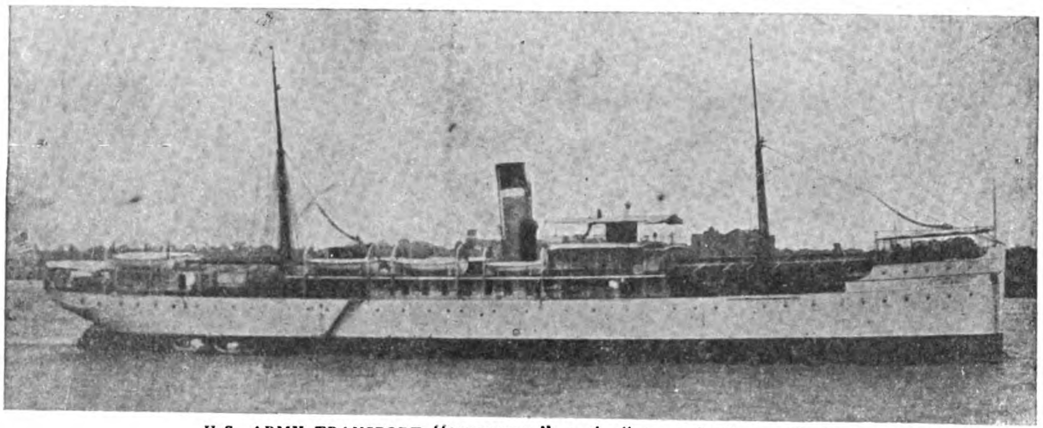
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″

Cable Address "FARNHAM"

Codes Used, A.B.C. 4th, 5th & 6th Editions A-1, Watkin's, Scott's, Western Union, Bentley's and Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are four in number, ranging in length from 355 feet to 700 feet on the Blocks, and breadth of entrance from 53 feet to 80 feet, with a depth of water on the sill of from 16 feet to 27 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs ; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Low Pressure Hot Water and Steam Heating Installations

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR
"F.B." INTERNATIONAL CODE

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

ENQUIRIES SOLICITED

Light railway lines are laid throughout workshops and yards.

A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

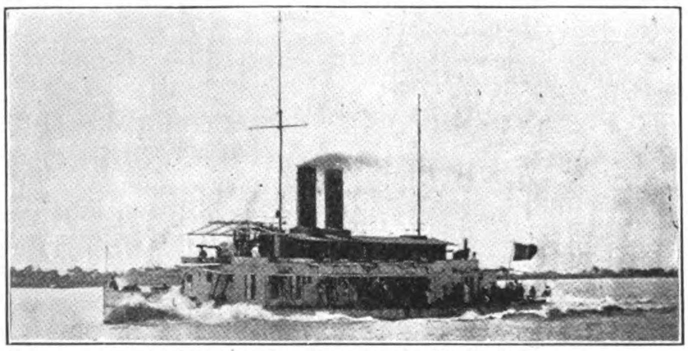
Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

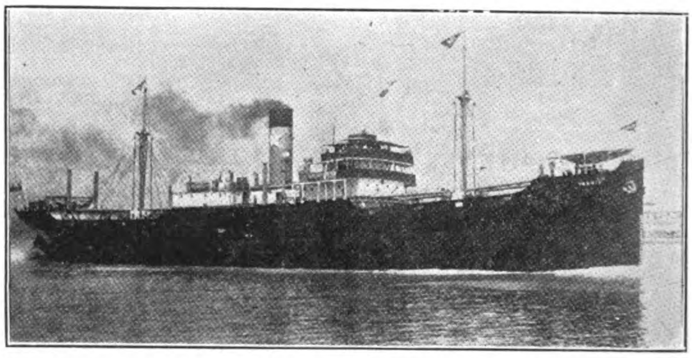
Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

PARTICULARS OF DRY DOCKS

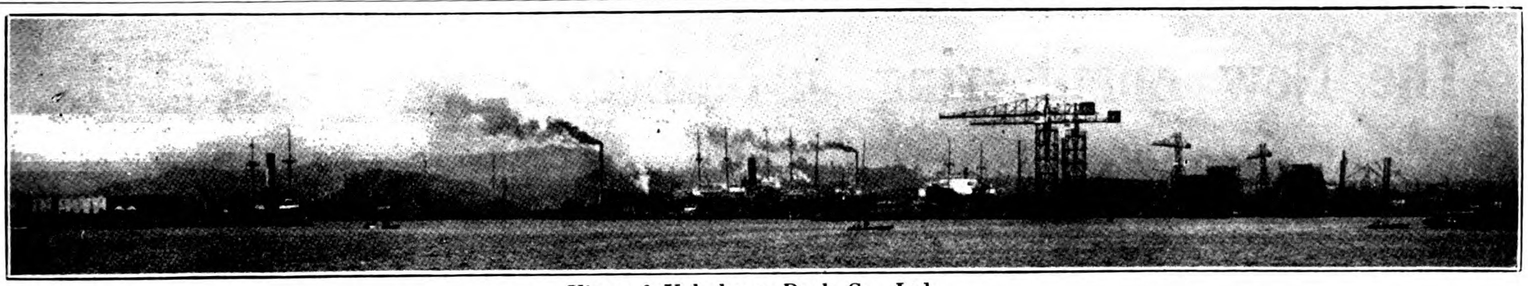
Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock ...	700 feet	80 feet	27 feet
International Dock ...	528 ,,	77 ,,	23 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,



H.I.M.S. "ERMANNO CARLOTTO"
Designed and Constructed for the Royal Italian Navy
Length 160 feet. Twin Screw Engines.
Draft 2 feet 10 inches with full equipment and 30 tons of coal on board. Mean continuous speed 14 knots per hour.



s.s. "YANNIS" ex "WAR TIARA"
Sister Ship s.s. "PANAGIS" ex "WAR DIADEM"
Sister Ship s.s. "MELLON" ex "WAR REGALIA"
Built for the British Government.



View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

Head Office: Nagasumi-cho :: *Warehouse Office:* Midori-cho

Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
"DOCK"
Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:

No. 1	625′ × 80′ × 28′
No. 2	380′ × 50′ × 26′
No. 3	480′ × 63′ × 21½′

SHIPBUILDING BERTHS:

No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4 / No. 5	680′ × 38′

WAREHOUSES:	TSUBO.
Iron Building	8,871.57
Concrete Building	1,636.99
Brick Building	2,011.72
Others	5,807.74

Directors: TOSHINOBU SUDA, Esq. *(Chairman)*, MANKICHI MIYANAGA, Esq. *(Managing Business Dept.)*, TAMATARO TOJO, Esq. *(Managing Shop Dept.)*

Agencies: NIPPON YUSEN KAISHA, London Branch. NIPPON YUSEN KAISHA, New York Branch.

All situated in Yokohama Harbour, the First Port at which Trans-Pacific Steamships arrive, and the Last Port from which they depart.

Complete Facilities for every Work and Fully Equipped up to date for

All Repairing Work. All Engine Work. All New Ship Work. All Boiler Work.

STAG BRAND

Edgar Allen

STAG BRAND

"Stag" Miners' Drill Steels

Have the same reputation in China as they have on the Rand and in Mines all over the world. Mine Managers know and trust them. Even where they are not actually used, their good quality is recognized. Stocks are held in most of the principal mining centres. Standardized quality prevents trouble to the consumer, each delivery giving the same results.

The Edgar Allen mark on drill steels means economy, reliability and efficiency.

Branch Office in Japan:
EDGAR ALLEN & CO., LTD.,
2 Mitsu Bishi Buildings,
1 Yaesu Cho, Kojimachi
Ku, Tokyo

Edgar Allen & Co. Ltd.
Imperial Steel Works
Sheffield

Agents in China:
Jardine, Matheson & Co., Ltd.,
8a Yuen-Ming-Yuen Road,
Shanghai
and at Hongkong, Tientsin,
Hankow, Peking, etc.

The New Engineering & Shipbuilding Works, Ltd.

PROPRIETORS OF THE YANGTSZEPOO DOCK

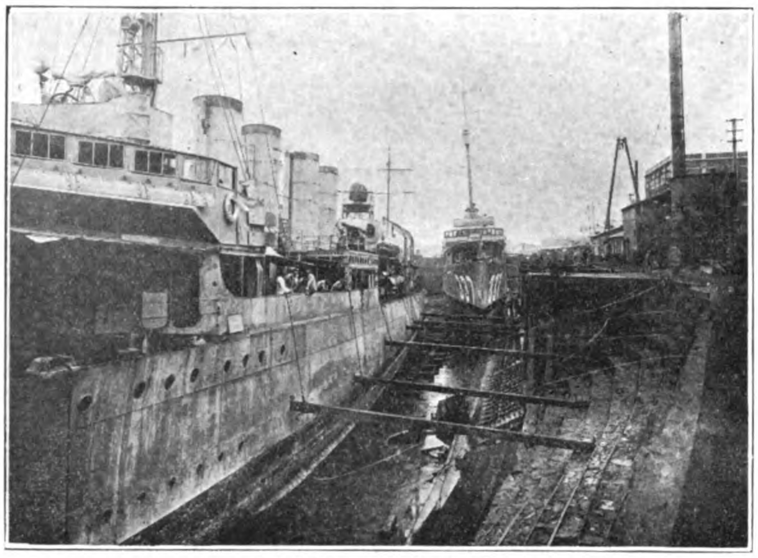
SHANGHAI, CHINA. CABLE ADDRESS, "SPEEDY"

Call Flag Inter "A"

DOCK PROPRIETORS AND SLIP OWNERS

YANGTSZEPOO DOCK
Length ....577″
Entrance ....70″
Width of Sill ....60″
Depth on Sill ....20″

PATENT SLIPS
For Vessels up to 200 feet long

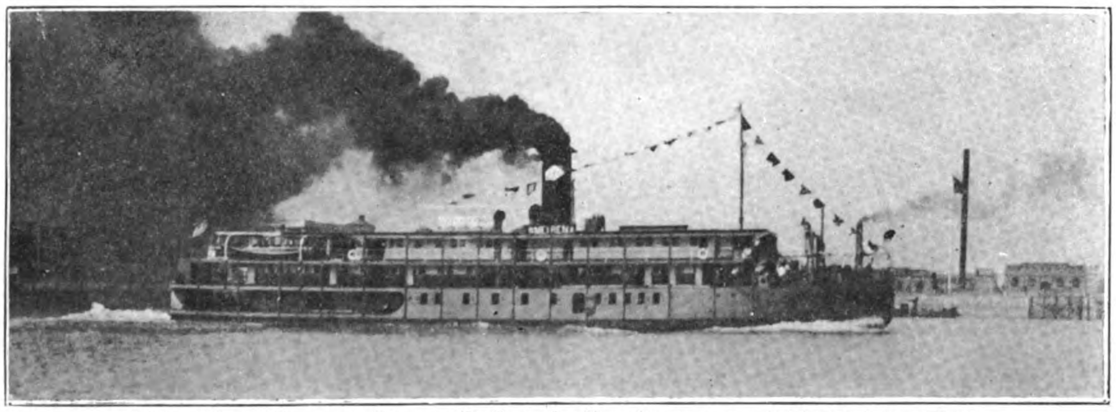


U. S. Destroyer in Dock

Vessels docked at Short Notice. All Repairs Carried out Efficiently and Expeditiously at Moderate Rates under European Supervision.

SHIPBUILDERS, SHIP-REPAIRERS, BOILERMAKERS, ELECTRICIANS, BLACKSMITHS, FOUNDERS, WELDERS, SALVAGE EXPERTS, MANUFACTURERS OF THE "SPEEDY" MOTOR

Makers under Royalty of Sturrock's Patent Furnace Bridges.



200-feet Upper Yangtsze Steamer Built at the New Engineering & Shipbuilding Works.

ESTIMATES, DESIGNS AND SPECIFICATIONS PREPARED FREE OF COST

for the construction of all classes of Steamers, Tow-boats, Launches, Lighters and Pontoons, Engines, Boilers and Condensing Plants, Pumps and Hoisting Engines, Structural Steel and Steel Window Casements, Power Plants for Mills and Filatures, Electrical Power and Light Installations, Water Tanks and Towers.

SOLE REPRESENTATIVES FOR

KITCHEN'S REVERSING RUDDERS

This Rudder Greatly Improves Engine Efficiency and Economy, Reduces Wear and Tear to a Minimum, and Improves the Steering and Manœuvring Qualities of the Vessel at all Speeds.

Cable Address:
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO., LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

DAIREN, N.-C.,
Dockyard & Engineering Works

HYOGO, KOBE
Steel Foundry, Bar Mill and Railway Shops

FUKIAI, KOBE
Plate Mill

BUILDERS OF

BATTLESHIPS, CRUISERS, TORPEDO-BOATS, DESTROYERS, SUBMARINES

ALSO, BUILDERS OF

FIRST-CLASS HIGH-SPEED OCEAN STEAMERS OF THE LARGEST SIZE AND POWER

CREOSOTED TIES

OF

PHILIPPINE TIMBER

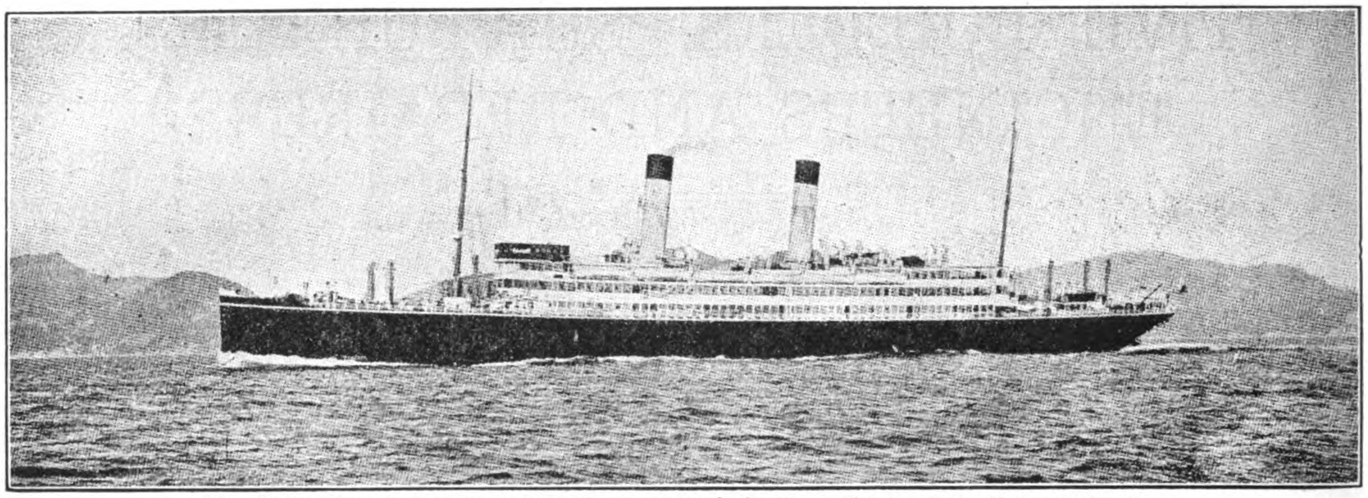
FOR

RAILROADS

ATLANTIC, GULF & PACIFIC CO. OF MANILA

77 Muelle de la Industria Manila, P.I.

Cable Address: "DREDGING"



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

DOCK No. 1			DOCK No. 2			DOCK No. 3		
Extreme Length	523	Ft.	Extreme Length	371	Ft.	Extreme Length	728.9	Ft.
Length on Blocks	513	,,	Length on Blocks	350	,,	Length on Blocks	714	,,
Width of Entrance on Top	89	,,	Width of Entrance on Top	66	,,	Width of Entrance on Top	$99\frac{1}{2}$	,,
,, ,, ,, ,, Bottom	77	,,	,, ,, ,, ,, Bottom	53	,,	,, ,, ,, ,, Bottom	$88\frac{1}{2}$	,,
Water on Blocks at Spring Tide	$26\frac{1}{2}$	,,	Water on Blocks at Spring Tide	24	,,	Water on Blocks at Spring Tide	$34\frac{1}{2}$	,,

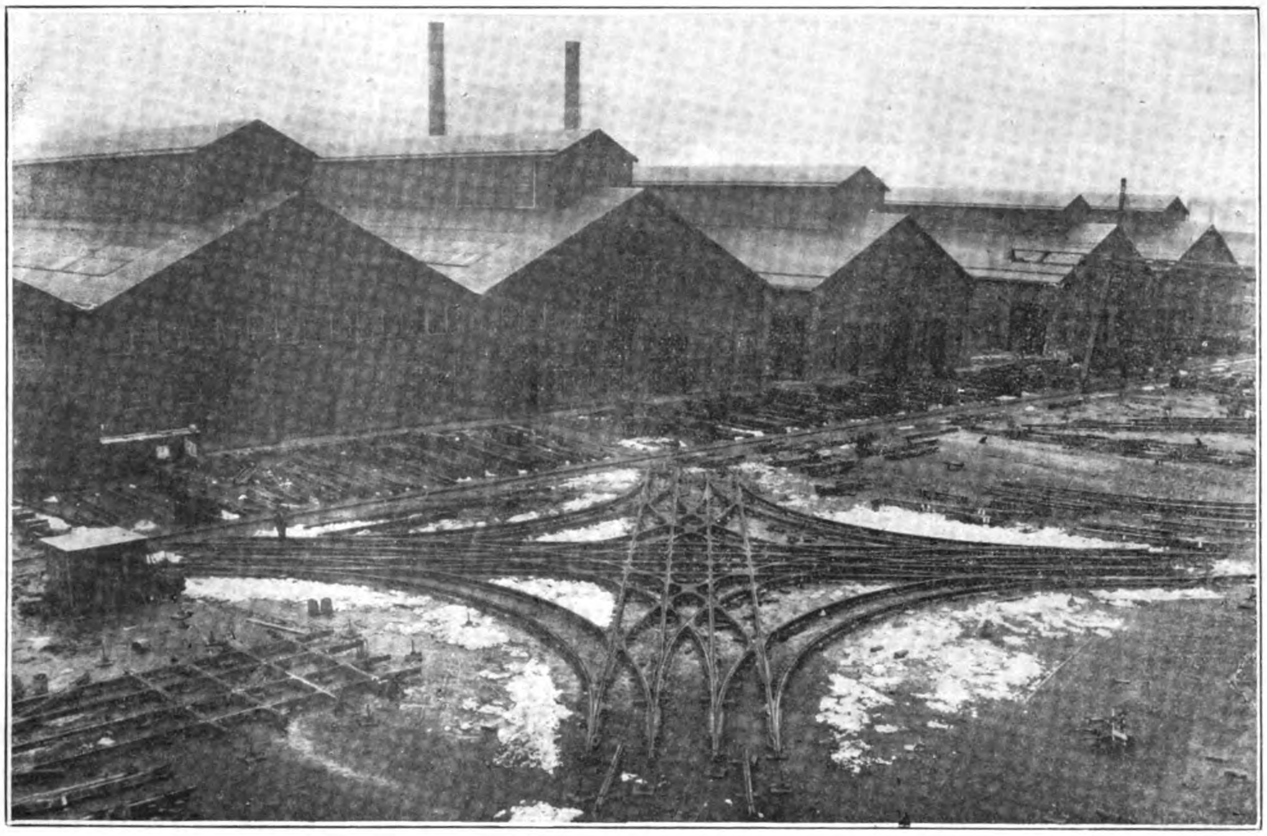
THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
Also Electrical Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND

LORAIN

Special Track Work



The Standard Tramway Construction Throughout the World

UNITED STATES STEEL PRODUCTS CO.

UNION BUILDING
THE BUND AND CANTON ROAD
SHANGHAI
CHINA

15 NAKADORI MARUNOUCHI
TOKYO, JAPAN

22 WU LIANG TA JEN HUTUNG
PEKING, CHINA

MITSUBISHI IRON AND STEEL CO., TD.

(MITSUBISHI SEITETSU KAISHA, LTD.)

HEAD OFFICE: MARUNOUCHI, TOKYO

CAPITAL: (PAID UP) YEN 30,000,000

MILL (LLOYD'S APPROVED) KENJIHO, CHOSEN (KOREA)

PRODUCTS PIG IRON—Basic & Foundry 100,000 tons.

STEEL—High Tensile & Mild Steel 50,000 tons.

BY-PRODUCTS—Sulphate of Ammonia; Pitch; Naphthalene; Tar Oil (light, middle, heavy); Slag-Cement, Slag Wool.

Sales Agents: **The Mitsubishi Trading Company, Limited**

BRANCHES AND AGENCIES: Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

MITSUBISHI MARINE & FIRE INSURANCE Co., Ltd.

MITSUBISHI KAIJO KASAI HOKEN
K. KAISHA

Head Office:
MARUNOUCHI, TOKYO

SUBSCRIBED CAPITAL - - Yen 5,000.000
PAID-UP CAPITAL - - - „ 1,250.000

Branches and Agencies:

LONDON, NEW YORK, OSAKA, KOBE, SHANGHAI, AND OTHER IMPORTANT CITIES AND PORTS IN THE WORLD

MITSUBISHI WAREHOUSE CO., LD.

(MITSUBISHI SOKO KAISHA, LTD.)

LANDING, SHIPPING AND FORWARDING AGENTS, STEVEDORES, CUSTOMS BROKERS & WAREHOUSEMEN

Head Office: MARUNOUCHI, TOKYO

Branches: TOKYO, YOKOHAMA, KOBE, OSAKA AND MOJI

General Managers of the

KYODO UNYU KAISHA

YOKOHAMA

3 KAIGAN-DORI, ITCHOME
YOKOHAMA
WITH TWO BRANCHES IN TOKYO

BRILL TRAMCARS

The construction of electric tramcars and trucks for service all over the world has engaged the facilities of the Brill Organization for the past 48 years.

East, West, North and South Brill-built tramcars and trucks have gone to live up to that reputation for correctness of design and workmanship that is largely responsible for the development of the Brill business to a place of international importance.

THE J. G. BRILL COMPANY

Philadelphia, Pa., U.S.A.

FAR EAST REPRESENTATIVES

ANDERSEN, MEYER & CO., LTD.
SHANGHAI

PACIFIC COMMERCIAL CO.
MANILA

Superior Barrel Shooks Bear This Trade Mark

Made by CALIFORNIA BARREL CO., San Francisco

THE KOSTER COMPANY

12 NANKING ROAD, SHANGHAI

FOREIGN MANAGERS

CALIFORNIA BARREL CO.

OF SAN FRANCISCO

CABLES "KOSTER"
ALL CODES

TOSHIN SOKO

KABUSHIKI KAISHA

WAREHOUSING, FORWARDING AND EXPRESS CO.

WAREHOUSEMEN LANDING AND SHIPPING

STEVEDORES CUSTOM BROKERS

WAREHOUSING AREA - - - - - - - - - 77,000 tsubo (308,000 Sq. yds.)

VALUE OF GOODS IN WAREHOUSE (latest date) - - - - Yen 95,000,000

CAPITAL (PAID UP) - Yen 5,000,000; RESERVE FUND - Yen 4,768,000

President: BARON TOSHITARO MITSUI

Managing Directors: H. OKUMURA and R. KADONO

Directors: K. HAYASHI and K. FUKUI

Auditors: E. KOSHI and T. MAJIMA

HEAD OFFICE: No. 5 HONKAWAYA-CHO, NIHONBASHI-KU, TOKYO

BRANCHES and SUB-BRANCHES:

TOKYO—Hakozaki-cho, Fukagawa-ku

OSAKA—Nakanoshima, Nishi, Utsubo, Aji-kawa, Nishinari, Sakurashima Chikuko

YOKOHAMA—Shinko-cho

NAGOYA

KOBE—Kano-cho

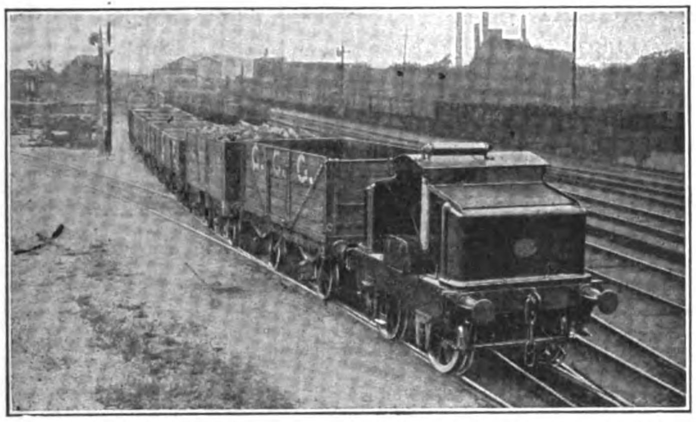
MOJI—Hama-cho

SHIMONOSEKI—Kannonzaki-cho

MOTOR RAIL & TRAM CAR CO., LTD.

LIGHT RAILWAY ENGINEERS

Manufacturers of Internal Combustion Engines; Locomotives, Rail-Inspection and Tramcars



40 H.P. Loco Working on Main Line Siding

These vehicles are thoroughly reliable, economical, inexpensive to maintain, easily handled and entail no stand-by losses

All kinds of Light Railway Material supplied

ENQUIRIES SOLICITED

WORKS & OFFICES: SIMPLEX WORKS: Bedford, England

Telegrams & Cables: Motral-Bedford
Codes: A.C.B. Engineering 5th Ed & Bentley

CIGARETTE MACHINERY

800 Cigarettes per Minute!

PLAIN OR TIPPED ON

Our New "Triumph-Model U.G." Cigarette Machine

The phenomenal speed of this machine, its supreme simplicity and its low cost of upkeep, are due to the revolutionary improvements in its design and construction—the outcome of 40 years of experience in the manufacture of cigarette machinery.

This machine is an indispensable part of the equipment of any modern up-to-date factory. Old modern machines are rapidly being replaced. The measure of your success depends on your cost of production.

Write for full particulars to-day on our—

CIGARETTE MACHINES
TOBACCO STEMMING MACHINES
AUTOMATIC KNIFE GRINDERS
CIGARETTE PACKING MACHINES

UNITED CIGARETTE MACHINE CO., Inc., Lynchburg, Va., U.S.A.

Agents for China: AMERICAN TRADING CO.
Robert Dollar Building, SHANGHAI

SHANGHAI TO SEATTLE 16 DAYS

A New Fast American
TRANS-PACIFIC SERVICE
between MANILA-HONGKONG
SHANGHAI
KOBE-YOKOHAMA
and PUGET SOUND
VICTORIA, B.C.—SEATTLE, WASH.
VIA THE SHORT ROUTE

UNITED STATES SHIPPING BOARD 535's

		Leaving Shanghai		Arr. Seattle	
President McKinley	(X Keystone State)	Sept.	24	Oct.	10
,, Jackson	(X Silver State)	Oct.	8	Oct.	24
,, Grant	(X Pine Tree State)	Oct.	22	Nov.	7
,, Jefferson	(X Wenatchee)	Nov.	5	Nov.	21
,, Madison	(X Bay State)	Nov.	19	Dec.	5

AGENTS

Manila: No. 24 Calle David, P.O. Box 1636
Hongkong: No. 2 Ice House Street.
Shanghai: No. 29-B Nanking Road, Amer. P.O. Box 503
Kobe: No. 7-A Kaigan-Dori, P.O.Box 308
Yokohama: No. 75-A Main Street, P.O. Box 326
Singapore: No. 2 Prince Street.

HEADQUARTERS FOR THE FAR EAST
No. 29-B Nanking Road, Shanghai.
Major GEO. A. HEYBURN, Acting Manager
GEO. J. McCARTHY, Assistant General Passenger Agent.

THE ADMIRAL LINE P.S.S.CO.

The ADMIRAL LINE

ANYWHERE ON THE PACIFIC
PACIFIC STEAMSHIP COMPANY

Amoy
Antung
Canton
Changsha
Chefoo
Chinkiang
Dairen (Dalny)
Foochow
Hankow
Harbin
Hongkong

BUTTERFIELD & SWIRE

(JOHN SWIRE & SONS, LTD.),
FRENCH BUND, SHANGHAI
Telephone No. Central 4881
AGENTS FOR

Ichang
Kiukiang
Kobe
Nanking
Newchwang
Ningpo
Shanghai
Swatow
Tientsin
Tsingtau
Wuhu
Yokohama

The Blue Funnel Line

(Ocean S.S. Co., Ltd. & China Mutual S. N. Co., Ltd.)

Fast Services

Japan, China, Hongkong, Philippines. Straits and Java to Europe via Suez Canal and to New York via Suez and Panama Canals also

Trans-Pacific between Oriental ports and West Coast of N. America.

CHINA NAVIGATION CO., LTD.

Passenger and Freight Steamship Services

SHANGHAI TO, AND FROM,

Weihaiwei, Chefoo and Tientsin (for Peking); Newchwang: Antung.

Hankow, Ichang (with connection to Chungking). Changsha, and Intermediate Yangtsze Ports.

Hongkong and Canton; Amoy and Swatow; Ningpo; and General Coasting Services.

HONGKONG TO, AND FROM,

Manila, Cebu. and Iloilo

Weihaiwei, Chefoo and Tientsin (for Peking)

Canton; Hoihow, Pakhoi and Haiphong; Bangkok and Singapore.

Shanghai and Yangtze Ports (as above)

Sydney, Melbourne and Australian Ports (Australian-Oriental Line)

Taikoo Sugar Refining Co., Ltd.

FINEST CANE SUGARS

Taikoo Dockyard & Engineering Company of Hongkong Ltd.

Ship Builders, Ship Repairers, Engine Builders, Boiler Makers, etc.

Fire and Marine Insurance

Fire

London and Lancashire Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

Guardian Assurance Co., Ltd.

Orient Insurance Company.

British Traders Insurance Co., Ltd.

Marine

British and Foreign Marine Insurance Co., Ltd.

Standard Marine Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

Sea Insurance Co., Ltd.

Guardian Assurance Co., Ltd.

KOKUSAI KISEN KAISHA

Nominal Capital	- -	Yen 100,000,000.00
Paid-up Capital	- -	„ 87,500,000.00
Aggregate Tonnage	- -	500,000 Tons

FLEET OF STEAMSHIPS

Name	Tons D.W.	Name	Tons D.W.
Rozan-Maru	8,700	Seifuku-Maru	9,100
Vancouver-Maru	9,100	Suez-Maru	6,600
Boston-Maru	8,800	Daio-Maru	9,000
Tofuku-Maru	9,100	Kashu-Maru	8,800
Chifuku-Maru	9,100	No. 2 Kifunesan-Maru	5,000
Ryufuku-Maru	9,100	Yousan-Maru	5,000
Hankow-Maru	6,400	Taisan-Maru	5,000
Yoni-Maru	11,000	Yuri-Maru	11,000
Taibu-Maru	8,900	Texas-Maru	11,000
San Francisco-Maru	9,100	Tamatsu-Maru	6,600
Naple-Maru	9,100	Eifuku-Maru	9,100
Glasgow-Maru	9,100	Kifuku-Maru	9,100
Yayoi-Maru	8,700	Toyofuku-Maru	9,000
Yaye-Maru	11,000	Raifuku-Maru	9,100
Malta-Maru	8,700	Keifuku-Maru	9,100
Buyo-Maru	8,800	Washington-Maru	9,100
Brazil-Maru	9,100	Tokufuku-Maru	9,100
Kofuku-Maru	9,100	Portland-Maru	9,100
Yezari-Maru	6,900	England-Maru	9,100
Yugao-Maru	5,000	Chili-Maru	9,100
Yubaye-Maru	5,000	Argentine-Maru	9,100
Sydney-Maru	6,400	Port Said-Maru	9,100
Shanghai-Maru	6,400	New York-Maru	9,100
Singapore-Maru	9,100	Karorin-Maru	6,400
Jyufuku-Maru	9,100	Tasmania-Maru	6,400
Hiyeizan-Maru	6,700		

Head Office: No. 8 Kaigan-dori, Kobe

BRANCH OFFICE:

Tokyo Kaijo Building, Maruno-uchi, Tokyo, Japan

Osaka Shosen Kaisha

(Osaka Mercantile Steamship Co.)

HEAD OFFICE: OSAKA, JAPAN

Cable Address: "SHOSEN, OSAKA."

Branches and Agencies at all the important ports in the World.

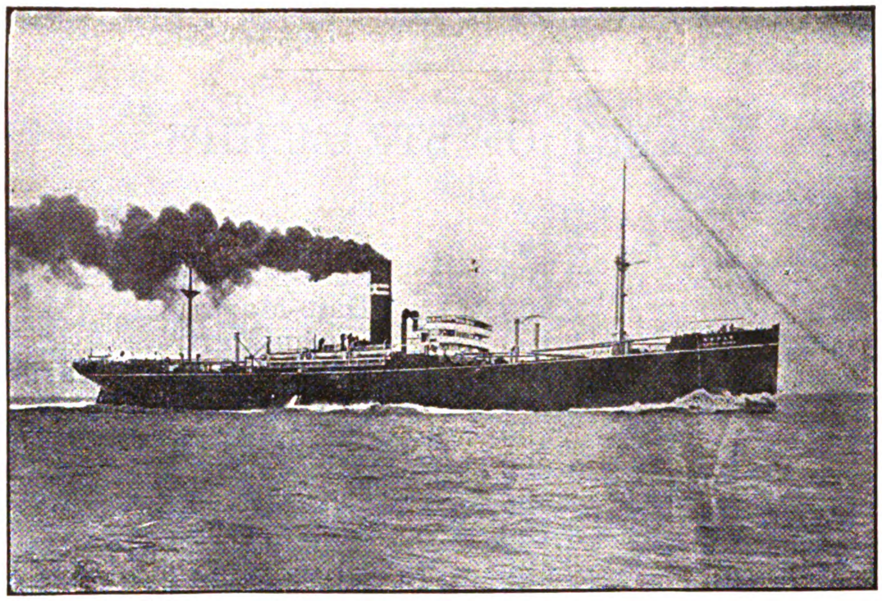
Codes Used: A1, A.B.C. 5th Ed.,

Scott's 10th Ed. & Bentley's.

Capital: Y. 100,000,000

Reserves: Y. 66,000,000

40 Regular Lines with a Fleet of 500,000 Tons Gross.



PRINCIPAL REGULAR LINES:

JAPAN-EUROPE LINE (via Suez)—Monthly—Ports of Call: Yokohama, Kobe, Moii, Shanghai, Hongkong, Singapore, Colombo, Port Said, Marseilles, London, Antwerp, Rotterdam and Hamburg.

JAVA-EUROPE LINE:—Monthly—Ports of Call: Sourabaya, Padan, Colombo, Port Sudan, Suez, Genoa, Marseilles, Antwerp and Hamburg.

CALCUTTA-NEW ORLEANS LINE: 7 sailings per annum—Ports of Call: Calcutta, Singapore, Hongkong, Nagasaki, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Cienfuegos and New Orleans.

SINGAPORE-NEW YORK LINE:—Monthly—Ports of Call: Singapore, Hongkong, Shanghai, Moji, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Havana and New York.

JAPAN-BOMBAY LINE:—Fortnightly—Ports of Call: Yokohama, Yokkaichi, Osaka, Kobe, Moji, Hongkong, Singapore, Colombo and Bombay.

HONGKONG-PUGET SOUND LINE:—Fortnightly—Ports of Call: Hongkong, Manila, Keelung, Shanghai, Nagasaki, Kobe, Yokkaichi, Shimizu, Yokohama, Victoria, Seattle, Tacoma and Vancouver.

JAPAN-SOUTH AMERICA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Nagasaki, Hongkong, Singapore, Colombo, Mauritius, Durban, Cape Town, Rio de Janeiro, Santos and Buenos Ayres.

JAPAN-AUSTRALIA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Osaka, Moji, Hongkong, Manila, Sydney, Melbourne and Adelaide.

JAPAN-JAVA LINE:—Monthly—Ports of Call: Osaka, Kobe, Moji, Keelung, Manila, Sandakan, Tawao, Batavia, Sourabaya and Macassar.

SERVICES TO CHINA.—

OSAKA—Dairen Line.—Semi-Weekly.
OSAKA—Tientsin Line.—6 Sailings per month.
OSAKA—Tsingtau Line.—2 Sailings per month.
YOKOHAMA—Dairen-Tientsin Line.—About 8 Sailings per month.
TAKAO—Tientsin Line.—2 Sailings per month.
Keelung-Hongkong Line.—Weekly.

Besides the above mentioned, Mail and Passenger Services are maintained by over THIRTY-FIVE REGULAR LINES, calling at all important ports in JAPAN, as well as STRAITS, DUTCH EAST-INDIES, FORMOSA, CHINA, KOREA, Etc., Etc.

COMPANY'S LOCAL OFFICES IN CHINA

AMOY, CANTON, FOOCHOW, HANKOW, SHANGHAI, TIENTSIN, DAIREN, HONGKONG

From San Francisco to Japan, China, Philippines and the Far East

CALLING AT HONOLULU, YOKOHAMA, KOBE, NAGASAKI, SHANGHAI, MANILA HONGKONG

NORTH AMERICAN LINE

S.S. "Shinyo Maru"—"Tenyo Maru" — 22,000 Tons, Triple Screw Turbine—21 Knots

S.S. "Korea Maru"—"Siberia Maru" — 20,000 Tons, Twin Screw Turbine—18 Knots

S.S. "Persia Maru," — 9,000 Tons

PERFECT SERVICE—UNEQUALLED CUISINE

Sailings from San Francisco

S.S. "TAIYO MARU"	sails for Orient	Oct. 17, 1922
S.S. "SIBERIA MARU"	" " "	Oct. 31, 1922
S.S. "TENYO MARU"	" " "	Nov. 10, 1922
S.S. "KOREA MARU"	" " "	Nov. 25, 1922

Sailings from Shanghai

S.S. "SIBERIA MARU"	sails for San F'cisco	Sept. 26, 1922
S.S. "TENYO MARU"	" " " "	Oct. 8, 1922
S.S. "KOREA MARU"	" " " "	Oct. 22, 1922
S.S. "SHINYO MARU"	" " " "	Nov. 5, 1922

SOUTH AMERICAN LINE

The only Regular Direct Service between the Orient (Hongkong, Mogi, Kobe, Yokohama), Hawaii (Honolulu), San Francisco, San Pedro (Los Angeles), Mexico (Salina Cruz), Panama (Balboa), and South America (Callao, Arica, Iquique, Valparaiso)

S.S. "ANYO MARU," 18,500 Tons S.S. "KIYO MARU," 17,200 Tons S.S. "SEIYO MARU," 14,400 Tons

and three additional steamers for monthly services

HEAD OFFICE: TOKYO, JAPAN

GENERAL OFFICE, YOKOHAMA, 5 YAMASHITA-CHO

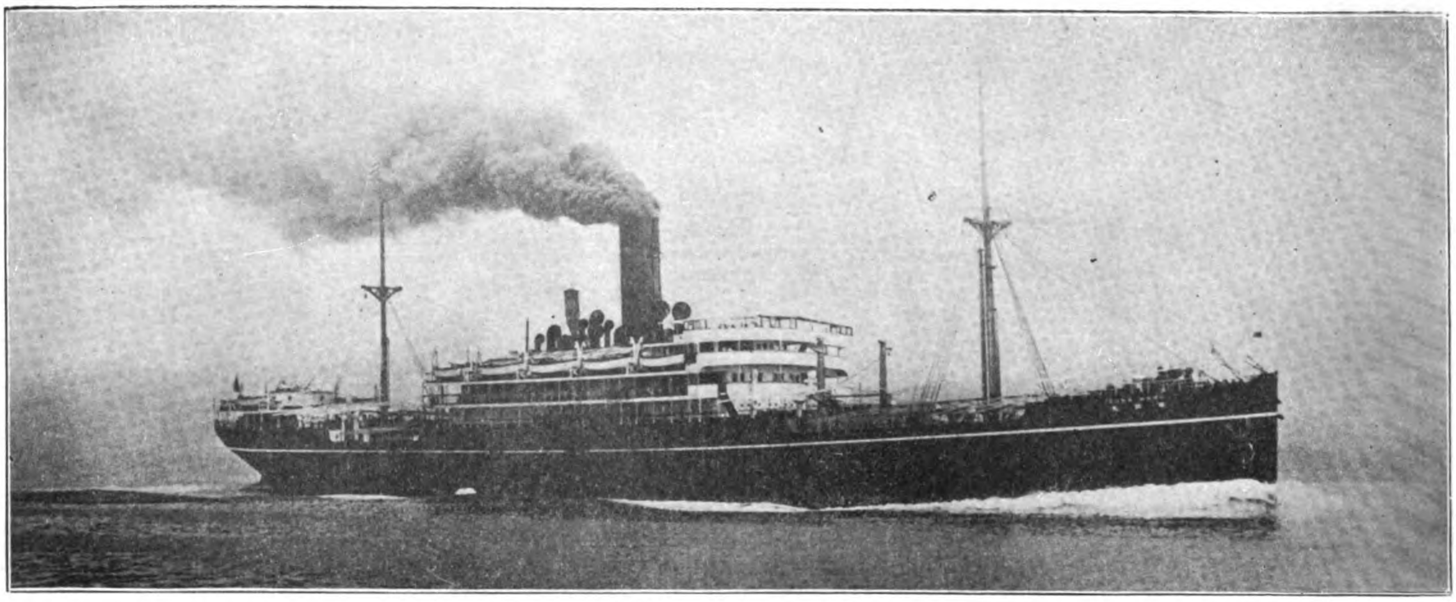
Branches: San Francisco: 625 Market St.; Chicago: 58 East Washington St.; New York City: 165 Broadway; Kobe: 83 Kyo-Machi; Shanghai: 71 Szechuen Road; Hongkong: King's Building; Manila: Chaco Building

Agency: Nagasaki: Holme, Ringer & Co.

TOYO KISEN KAISHA ORIENTAL S.S. Co.

NIPPON YUSEN KAISHA

HEAD OFFICE, TOKYO, JAPAN



"SUWA MARU"

OVER THE

THE PALATIAL STEAMERS OF THE N.Y.K.

WILL CARRY YOU IN COMFORT, CLEANLINESS AND WITH COURTESY

PRINCIPAL SERVICES

EUROPEAN LINE (Fortnightly)

WEST COAST LINE (Monthly).
GLASGOW, BIRKENHEAD, AND SWANSEA (occasionally).
SINGAPORE, HONGKONG, SHANGHAI AND JAPAN.

NORTH CONTINENTAL LINE (Monthly).
HAMBURG, GRANGEMOUTH, ROTTERDAM AND ANTWERP.
STRAITS, JAVA, CHINA AND JAPAN.

NORTH AMERICAN LINE (Every 3 Weeks).
HONGKONG, MANILA, SHANGHAI, KOBE AND YOKOHAMA.
VICTORIA, B.C., AND SEATTLE.

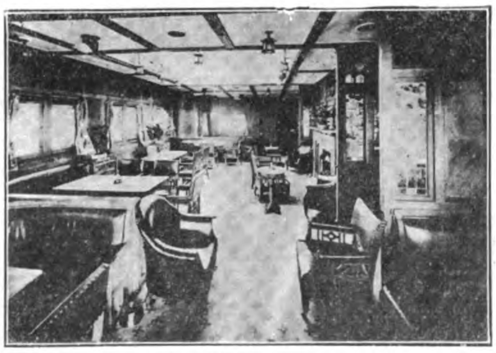
SOUTH AMERICAN LINE (Every 2 Months)
KOBE, SINGAPORE, DURBAN AND CAPETOWN.
SANTOS, RIO DE JANEIRO AND BUENOS AIRES.

AUSTRALIAN LINE (Monthly).
YOKOHAMA, KOBE, HONGKONG, MANILA, ZAMBOANGA, THURSDAY ISLAND, TOWNSVILLE, BRISBANE, SYDNEY AND MELBOURNE.

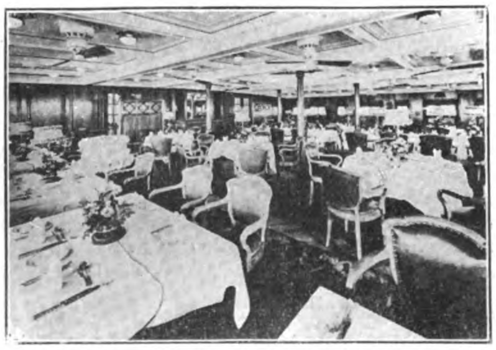
BOMBAY LINE (Fortnightly).
KOBE, SHANGHAI, HONGKONG, SINGAPORE, MALACCA, COLOMBO, TUTICORIN AND BOMBAY.

CALCUTTA LINE
(FORTNIGHTLY) YOKOHAMA, KOBE, HONGKONG, SINGAPORE, PENANG, RANGOON AND CALCUTTA.
(MONTHLY) CALCUTTA, MADRAS, COLOMBO, SUEZ, PORT SAID, ALGIERS AND NEW YORK.

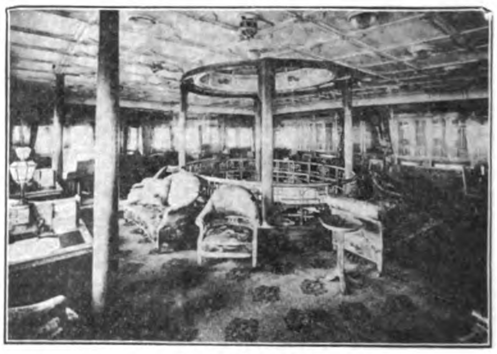
NEW YORK-FAR EAST LINE (Fortnightly)
KOBE, YOKOHAMA, SAN FRANCISCO, PANAMA, COLON, HAVANA AND NEW YORK.
NEW YORK TO JAPAN, CHINA AND PHILIPPINES.



Smoking Room



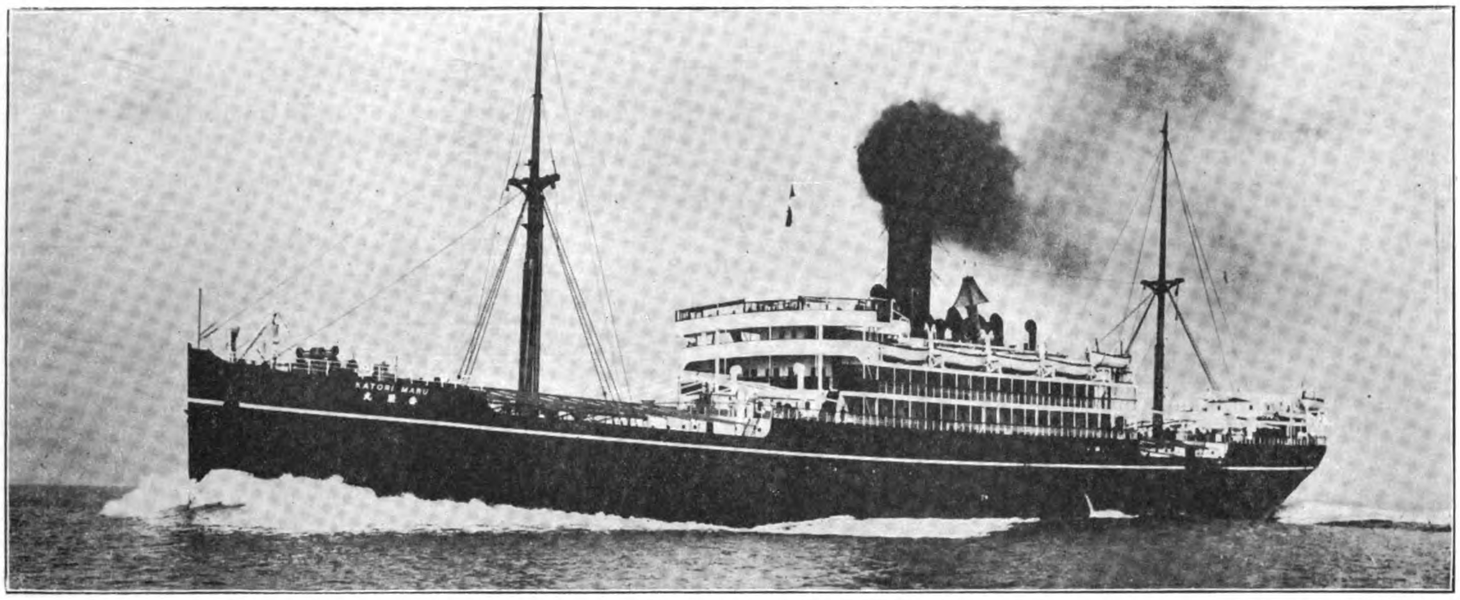
Dining Saloon



Social Hall

NIPPON YUSEN KAISHA

FLEET: 114 STEAMERS, 574,594 GROSS TONS



"KATORI MARU"

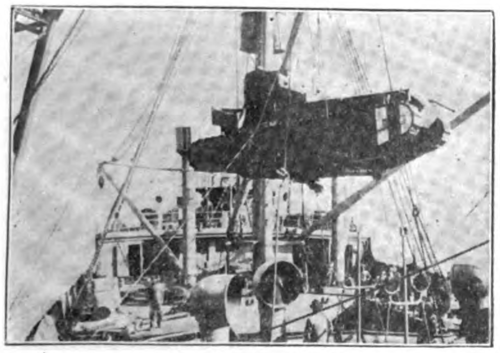
SEVEN SEAS

SHIPPERS WILL FIND QUICK DISPATCH, WITH WHARF, WAREHOUSE AND TERMINAL FACILITIES AT ALL PRINCIPAL PORTS SERVED BY N.Y.K. STEAMERS

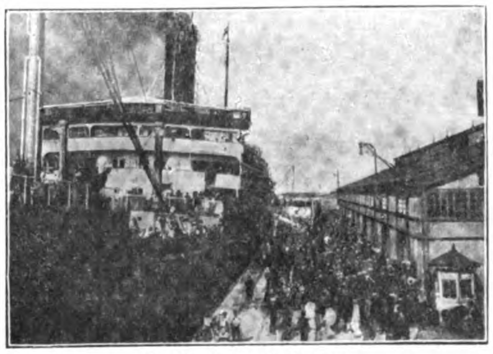
PRINCIPAL BRANCHES AND AGENCIES

Yokohama	Tokio	Nagoya	Keelung
Kobe	Moji	Nagasaki	Hankow
Hakodate	Otaru	Tientsin	Singapore
Tsingtao	Hongkong	Canton	Bombay
Penang	Colombo	Calcutta	Liverpool
Port Said	Marseilles	London	Chicago
Antwerp	Rotterdam	New York	Brisbane
Seattle	Manila	Townsville	Shanghai
Sydney	Melbourne	Osaka	

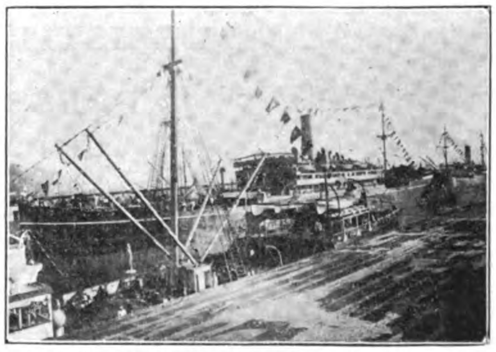
GIVE JAPANESE STEAMSHIPS THEIR SHARE OF YOUR JAPANESE CARRYING TRADE



Landing a Tank



Dock at Yokohama



Great Northern Dock at Seattle

Chartered Bank of India, Australia and China

INCORPORATED BY ROYAL CHARTER, 1853

Capital £3,000,000
Reserve Fund £3,700,000
Reserve Liabilities of Shareholders . £3,000,000

Head Office: 38 BISHOPSGATE, LONDON, E.C.
Shanghai Branch: 18 THE BUND.

Court of Directors:

SIR MONTAGU CORNISH TURNER, *Chairman.*
SIR DUNCAN CARMICHAEL
THOMAS CUTBERTSON, Esq.
SIR ALFRED DENT, K.C.M.G.
SIR WILLIAM HENRY NEVILLE GOSCHEN, K.B.E.
THE RIGHT HON. LORD GEORGE HAMILTON, G.C.S.I.
SIR JOHN NEWALL JORDAN, P.C., G.C.I.E., K.C.B., K.C.M.G.
WILLIAM FOOT MITCHELL, Esq.
JAMES MAXWELL GRANT PROPHIT, Esq.
LEWIS ALEXANDER WALLACE, Esq.

Chief Manager: W. E. PRESTON
Managers: J. S. BRUCE & G. MILLER

Bankers:

THE BANK OF ENGLAND.
THE LONDON JOINT CITY & MIDLAND BANK, LTD.
THE LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.
THE NATIONAL PROVINCIAL & UNION BANK OF ENGLAND, LTD.
THE NATIONAL BANK OF SCOTLAND, LTD.

Agencies and Branches:

Alor Star (Kedah)	Bombay	Colombo	Iloilo	Kuala-Lumpur (F.M.S.)	New York	Saigon	Taiping (F.M.S.)
Amritsar	Calcutta	Delhi	Ipoh	Madras	Peking	Seremban	Tavoy
Bangkok	Canton	Haiphong	Karachi	Manila	Penang	Shanghai	L. Burma
Batavia	Cawnpore	Hankow	Klang	Medan	Puket	Singapore	Tientsin
	Cebu	Hongkong	Kobe		Rangoon	Sourabaya	Yokohama

Drafts granted on the above Agencies and also on the principal Commercial Cities throughout the world. Bills of Exchange bought and received for collection. Travellers' Letters of Credit issued and every description of Banking and Exchange business undertaken.

C. J. SCOTT,
Manager.

ATTWATER & SONS

CANADIAN AND INDIAN MICA—

CUT, SLAB, and SPLITTINGS (Minimum Stock 200,000 lbs.) DYNAMO TAPES, ASBESTOS TAPES, and HOLLOW BRAIDS. EMPIRE CLOTH and LINO TAPES. PURE COTTON DUCKS and DRILLS. ARMATURE BINDING CORDS and ROPES VULCANISED FIBRE EBONITE, SHEET, RODS and TUBES.

PEERLESS LEATHEROID INSULATION
THE GREATEST INSULATING PAPER MADE

"RESISTIT" (SYN BAKELITE) PAPER, SHEET, & TUBE

PRESSPAHN AND INSULATING PAPERS
ELECTRICAL PURE RUBBER AND ADHESIVE TAPE

Contractors to the Admiralties and War Office, British, American, French and Italian Governments

Hopwood Street Mills, PRESTON, Eng. ESTABLISHED 1868
Telegrams: "Attwaters, Preston" *Telephone No.:* 1045 (2 lines) *Codes:* 5th Edition A.B.C., and Western Union

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVIII SHANGHAI, SEPTEMBER, 1922 No. 9

Engineering Progress in Korea

The Advance of Industry and Public Works in the "Land of the Morning Calm"

Harbor Improvements

DURING the protectorate *régime* a sum of over Y.4,000,000 was allotted in the budget for building customs piers in eleven harbors, viz., Fuzan, Jinsen, Chinnampo, Heijo, Genzan, Shingishu, Gunzan, Moppo, Seishin, Joshin and Bazan, and while work was still going on in such important harbors as Jinsen, Fuzan and Chinnampo, the treaty of annexation was signed, in consequence of which the government-general took over all these works, enlarged their scope, and has all but completed them, except in Genzan where the work was not begun until the fiscal year 1915.

(*a*) FUZAN

The scheme for Fuzan was to construct two iron piers, adjust the landing-place, and dredge the harbor. Pier No. 1 was finished in March, 1912. It is 152 *ken* long and 12.7 *ken* wide, and can accommodate at the same time two steamers of 3,000 to 4,000 tons on its southern side, while on the north it is connected with an extension of the railway station, thus giving direct connection between steamer and train. Pier No. 2 was constructed parallel with Pier No. 1 to the north and has a length of 200 *ken* and a width of 21 *ken*, thus enabling it to accommodate four steamers of 7,000 to 20,000 tons at the same time, two on either side. Three railway tracks are laid on it on which light engines for haulage are employed. In addition, sheds were built for temporary storage, and the harbor was dredged at its mouth and near the pier to the depth of 24 to 36 *shaku*. This work was all completed in the fiscal year 1918 and cost Y.3,940,000.

These arrangements were all based on a maximum capacity of 700,000 tons a year, but, of late, trade through this port has increased far more rapidly than expected and reached over 1,590,000 tons in 1918, giving every sign of still further increase, so the government-general planned a second program comprising (i) enlargement of the jetty connected with Pier No. 1 to afford space for building sheds and roads on it, constructing at the same time a new quay wall 215 *ken* long and 50 *shaku* wide and making the width of the pier 56.5 *ken* ; (ii) widening Pier No. 2 to 61 *ken*, making the middle part of it a mole and the two sides mooring piers, and constructing sheds, tracks and roads on it ; (iii) construction of a breakwater at the mouth of the harbor ; and (iv) dredging of 220,000 *tsubo* of the area of the harbor to the depth of 24 to 27 *shaku* so as to obtain a more extensive anchorage, and providing mooring arrangements in the docking area at Kitahama. This program was scheduled to be accomplished in six years from the fiscal year 1919 at an estimated expenditure of Y.9,172,000.

BARON M. SAITO,
Governor-General of Chosen

(*b*) JINSEN

Jinsen, opened to foreign trade in 1883, is a port not far distant from Kejio, and occupies a position in the foreign trade of the country second only to Fuzan. On account of the difference between ebb and flow, averaging as much as 33 *skaku*, great inconvenience was experienced in mooring and unloading, so the government-general enlarged the scope of the harbor works there and decided to provide it with a lock-gate dock. In form the lock-gate is exactly similar to the Panama Canal gate. The water inside the dock has an area of 30,000 *tsubo* and a depth of 27 to 30 *shaku*. One side of it, forming a quay wall 250 *ken* long, can accommodate three steamers of 4,500 tons, while the other side is used for unloading. To shelter the harbor and make easy the entrance and exit of ships, and to give convenience to ships mooring inside the dock, it was planned to construct a jetty between the city of Jinsen and Getsubito (an island), and a training wall 790 *ken* in length running south-west of Sha-to, while sheds and tracks were also to be provided. The work was started in 1911 at an estimate of over Y.7,000,000 with the expectation of finishing it in the fiscal year 1922. The lock-gate dock, the principal part of the program was finished in October, 1918, and has since been in great use as the following table shows :—

	Ships Entering Harbor		Ships Entering Dock	
	Number	Tonnage	Number	Tonnage
1919	7,828	539,355	1,068	293,826
1920	7,820	535,396	1,296	343,203

There is now in progress investigation of the works requiring to be done for the enlargement of the harbor, improvement of the fairway, and increasing the depth of water.

(*c*) CHINNAMPO

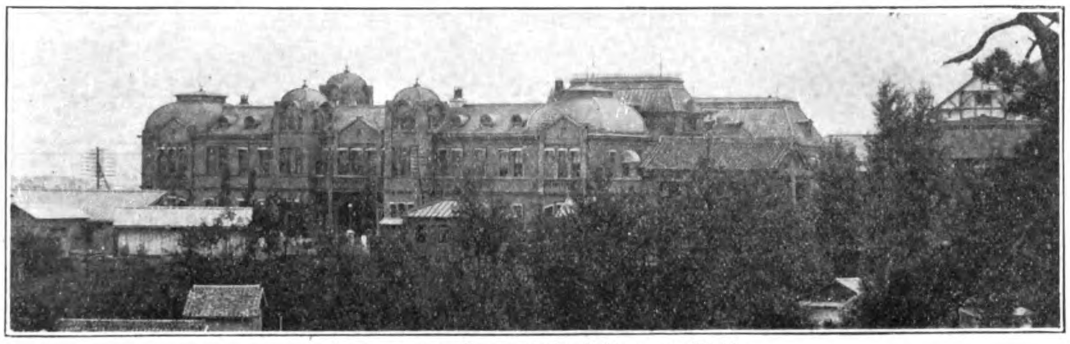
The works here were begun as a four-year undertaking in the fiscal year 1911, and finished as planned in 1914 at a cost of over Y.830,000. The principal work was the building of a quay wall so equipped as to be able to accommodate two steamers of over 3,000 tons at the same time along its length of 140 *ken*, but the maximum difference of 24 *shaku* between ebb and flow is the source of much inconvenience in unloading, so the government-general is now making investigation of the works necessary for coping with this difficulty and for ensuring the future development of the port.

(*d*) GENZAN

The harbor works at Genzan are now under way as a seven-year undertaking from the fiscal year 1915, the estimates for them being put at Y.2,640,000. The principal work of the program was the building of a quay wall 150 *ken* long and capable of accommodating two steamers of 3,000 tons at the same time. The depth of water at the anchorage was increased by dredging from 21 to 24 *shaku*, and a breakwater 225 *ken* long was constructed at the mouth of the harbor. Minor parts of the work were the lengthening of the existing pier, the filling in of the foreshore on an area of 20,000 *tsubo*, and the building of a place 270 *ken* long for unloading. All is finished with the exception of some part of the land equipments.

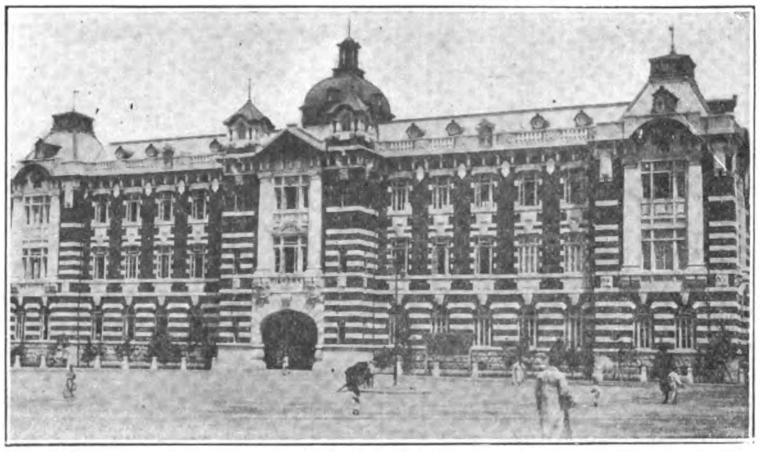
After these harbors the one requiring urgency in improvement in its equipment is Seishin, and investigation of the works to be done is now in progress.

Improvement in shelters for fishing vessels is also urgently needed, and to effect this the government has granted subsidies since the fiscal year 1912. To fishing ports of special importance experts are sent from the government-general to make actual investigation of the equipment



Government General Building, at Keijo

Dr. R. MIDZUNO,
Former Administrative Superintendent of Chosen. Now Minister for Home Affairs in the Kato Cabinet



Keijo Post Office

necessary for the future.

River Improvement

The large rivers in Chosen, such as the Oryoku, the Daido, the Kan, and the Rakuto, are of great service to traffic and communications. At the same time they are apt to be a source of danger to the lands on either bank every time they are in flood, since nothing has ever been done to keep them within their proper limits and the forests watered by them have been cut down regardless of resultant evils, and also a cause of great economic loss to the state.

On the establishment of the government-general, therefore, the program already in the course of execution was enlarged and made to take in the investigation of highlands and the encouragement of afforestation, and thus secure the longer retention of the water falling in the form of rain or snow, but as years must pass before the desired result can be attained and large sums of money must be expended, the immediate steps taken were the promulgation of regulations for the control, preservation, and utilization of rivers so as to prevent change in their present condition, and the starting of a close investigation of the four large rivers above mentioned and ten others, and this latter work is expected to be finished in the fiscal year 1926.

Waterworks

Owing to the geological formation of the country the drinking water is in general very hard, while the wells, being usually shallow, easily become polluted, especially in towns where the population is dense. In addition, the supply of water often runs short and thus threatens the well-being of the people. To overcome this difficulty the government-general has continuously encouraged the establishment of waterworks, so that sanitary conditions might be improved.

The only city possessed of waterworks before the annexation was Keijo. Now, not only are the prefectural municipalities and sites of provincial offices provided with waterworks but other important towns also, the

total number being 24, and not a few other towns are busy making good their deficiency in this respect.

So far as management is concerned, existing waterworks are divided into two classes, those directly maintained by the government and those by localities and public bodies. To the latter a subsidy equal to half the cost of construction is granted, and, as waterworks are essentially works of local interest and ought not to be maintained either in part or in their entirety by the state, the government-general is planning the early transfer of the former class to the prefectural municipalities concerned.

Buildings

(*a*) Government-General Offices

The present offices of the government-general find place in the old building of the residency-general and the various additions since made, but they are not suitable as government offices either with regard to site or to equipment, so after careful investigation a site for new offices was chosen in 1912. The site selected was the front part of the grounds of Keifuku palace or north palace, and here it was planned to erect an iron-framed concrete building of five stories, including attic and basement, covering 2,115 *tsubo*, and the work was started in July, 1916, as an eight-year undertaking at an estimated expenditure of Y. 3,000,000, but the rise in price of material and labor has already added Y. 900,000 to the cost, and indications point to further increase to about Y. 3,000,000 more if the work is to be executed according to the original plans.

(*b*) Various New Buildings

Most of the public offices in Chosen are housed in old Korean buildings, which are very inconvenient for the dispatch of business, so the government-general has been spending annually Y. 2,000,000 or Y. 3,000,000 in building provincial offices, police stations, law courts, prisons, etc., and in the fiscal year 1920, on account of the introduction of a cultural policy, the building estimates were increased to Y. 9,000,000, including the Y. 700,000 annually earmarked for the building of the new government offices.

Though an extraordinary transformation has been effected in administrative affairs, no shrine for national ceremonies has yet been erected, so, by Notification No. 12 of the Cabinet in July, 1919, a site was chosen on Nanzan or South Hill, Keijo, for the erection of a government grand shrine for the veneration of Amaterasu-O-Mikami and the late Emperor Meiji at an estimated expenditure of Y. 1,500,000. Work on the Chosen shrine, as it is named, is now in progress, and the ceremony for purification of the building site was held on the 27th of May, 1920. According to the plan the site of the shrine itself and the three terraces of approach covers some 7,000 *tsubo*. The surrounding ground, about 90,000 *tsubo*, is called the Inner Garden, and there is an Outer Garden of about 110,000 *tsubo* on the eastern side of it.

Electric and Gas Undertakings

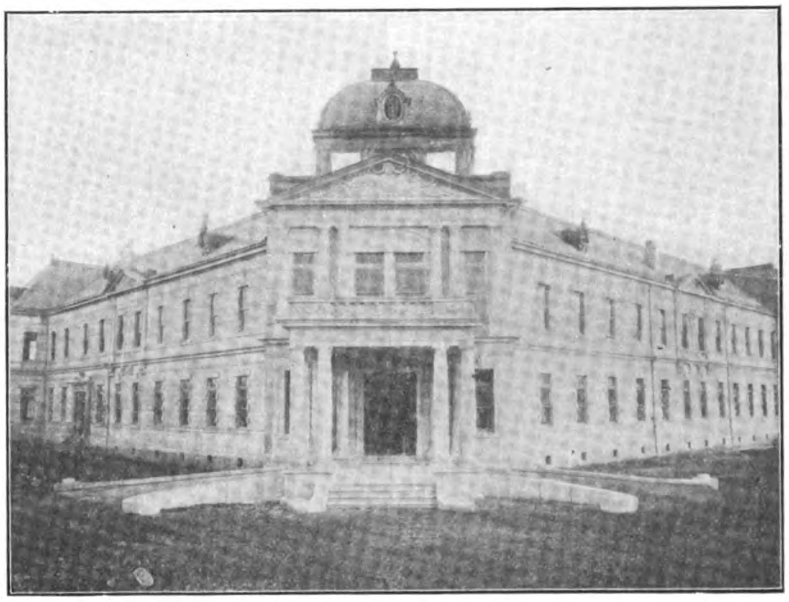
(1) Electric Undertakings

The first electric undertaking in Chosen was the building of a tramway by the Kanjo Electric Company established by an American in 1899, and in 1901 it started the supply of electricity for lighting purposes. Similar undertakings were started in Fuzan in 1902 and in Jinsen in 1906, after which no further progress was made, and at the time of annexation electric undertakings in the country numbered but three with an aggregate capital of Y. 3,300,000 and a capacity of 1,380 kilowatts.

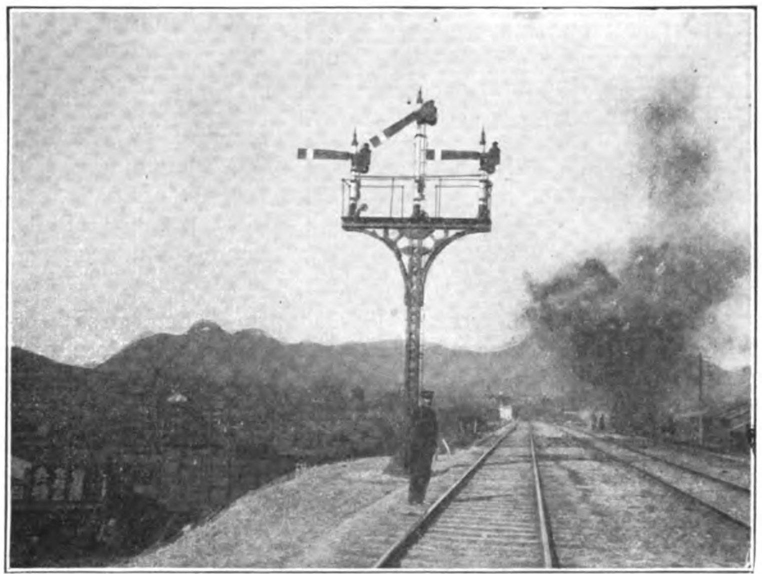
Japanese, however, entering more and more freely into Chosen, and the population in cities becoming more and more dense, commercial and industrial undertakings came into existence one after the other, social and economic conditions improved, and the

The Bank of Chosen at Keijo

Mr. S. Minobe, Governor of the Bank of Chosen



Offices of the Oriental Development Company at Seoul



Nandaimon Station Yard, Seonl

Moppo Station

growing tendency to use electric light and power in Japan proper exerted its influence in Chosen, and not only was the Kanjo Electric Company bought out by a Japanese company but many other electric undertakings were promoted in rapid succession.

Previous to annexation there were no regulations for the control of these undertakings, but, after the establishment of the government-general in 1910, regulations were promulgated, by virtue of which it was necessary to obtain permission of the government before starting any new electric undertaking, and recognition by the authorities of the proposed scale of charges.

Since the framing of these regulations electric undertakings have undergone a very healthy development, and the advance in the condition of the people, especially under the influence of the situation in the fiscal years 1918 and 1919, caused the demand for electric power to increase greatly, and at the end of the fiscal year 1920 there were 37 electric undertakings under way, of which 28 were actually at work, having a total capital of Y.48,950,000 of which Y. 17,710,000 was paid up, and a capacity of 35,500 kilowatts. In addition to these there were ten undertakings run by the government for its own use, and 42 private ones.

In former times almost all electric undertakings in Chosen depended upon heat for their motive power, only two or three making use of water-power, so in 1911 the government-general began to make investigation of water-power that might be utilized for generating electricity, and completed it with respect to eleven of the larger rivers, such as the Rakuto, Kan and Daido, and part of the Oryoku, in the fiscal year 1914, discovering thereby 80 sites capable of generating 76,000 h.p., of which 39 with a combined capacity of 33,900 h.p. were regarded as of easy and profitable management, and these were surveyed and work started on them, and, as the healthy development of electric undertakings requires long years and close investigation, the government-general is thinking to make of these reliable object-lessons to those intending to start similar works elsewhere.

(2) Gas Undertakings

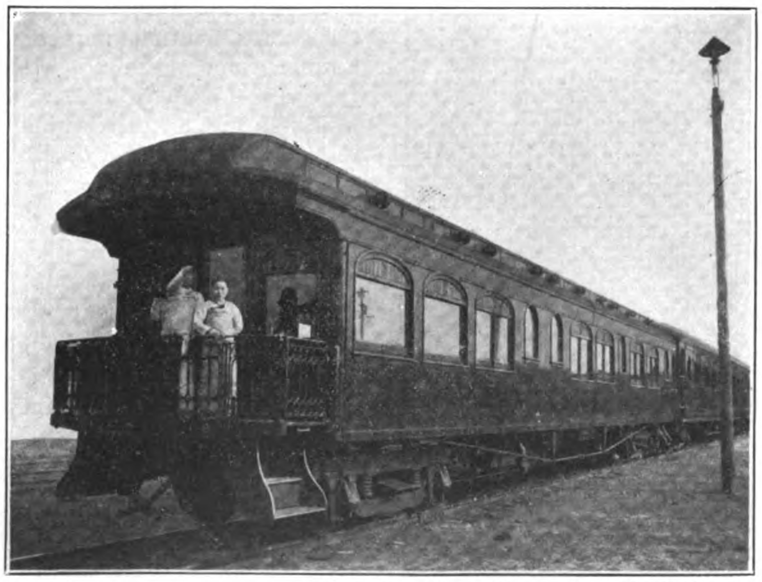
There are two gas-producing undertakings in Chosen, one at Keijo and the other at Fuzan, both being carried on as branch works by electric companies. The former started work in 1909 and the latter in 1912 on an aggregate capital of Y.2,200,000, and the gas produced by them reached 141,690,000 cubic feet in the fiscal year 1919.

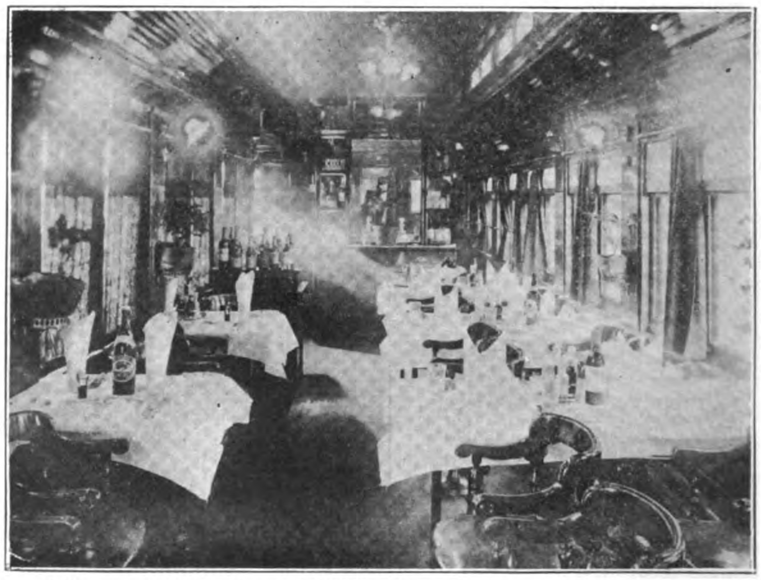
Control of gas undertakings was formerly exercised by the police authorities, but, as they are carried on by electric companies, they were put under the supervision of the communications bureau in May, 1919, in order that control of both businesses might be uniform.

Railways

(1) State-owned Railways

The first instance of a railway in Chosen was the Keijo-Jinsen line opened for general traffic in 1899 by the Kei-Jin Railway Company. In 1901 the Kei-Fu Railway Company was established

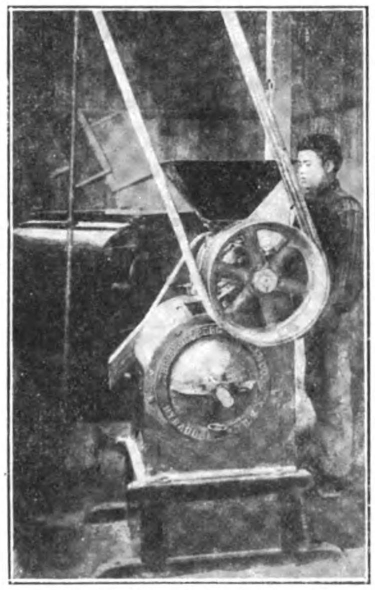


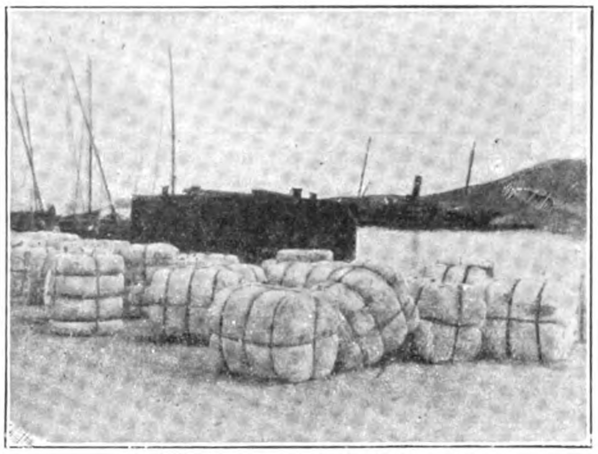


Luxurious Traveling on the S.M.R. Express through Korea; Observation and Dining Cars

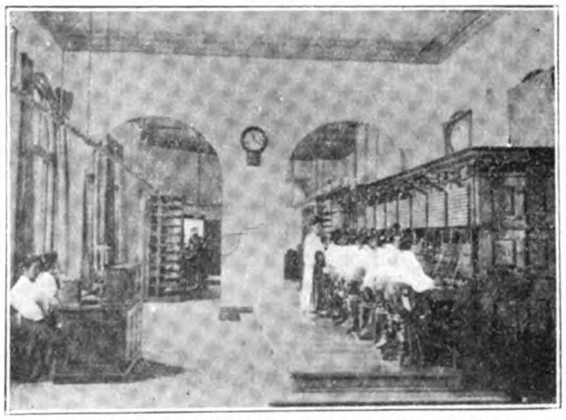
and began the construction of the line between Keijo and Fuzan, and in 1903 bought the Kei-Jin line. In 1904 the line between Keijo and Fuzan was opened to traffic, and in 1905 the line between Keijo and Shingishu and the Bazan Line were completed for the use of the army during the Russo-Japanese war. In 1906 the Japanese imperial government bought out the Kei-Fu Railway Company and took over the Keijo-Shingishu and the Bazan lines from the department of war, and all were placed under the control of the railway superintendence bureau of the residency-general. In 1909 they were again made part of the Japanese government railways, but, on the government-general being established in 1910, control of them once more changed hands. During all this time improvement and construction work was steadily carried on, and the year 1910 saw the completion of the line between Heijo and Chinnampo; in 1911 the Oryoku was spanned by an iron bridge, thus connecting the railways in Chosen with the South Manchuria railway; in 1914 the line between Taiden and Moppo and that between Keijo and Genzan were completed; in 1915 part of the line between Genzan and Kwainei was opened. The last named is still in the course of construction, but traffic is already regularly conducted between Seishin and Kwainei in its northern part and between Genzan and Kanko in its southern part, and at the end of the fiscal year 1920 the total mileage of state-owned railways open to business in Chosen was 1,157 miles.

Cotton Ginning in Korea


Rice Cleaning Machine


Ginned Cotton ready for Shipment

Telegraph Room at Fusan Post Office

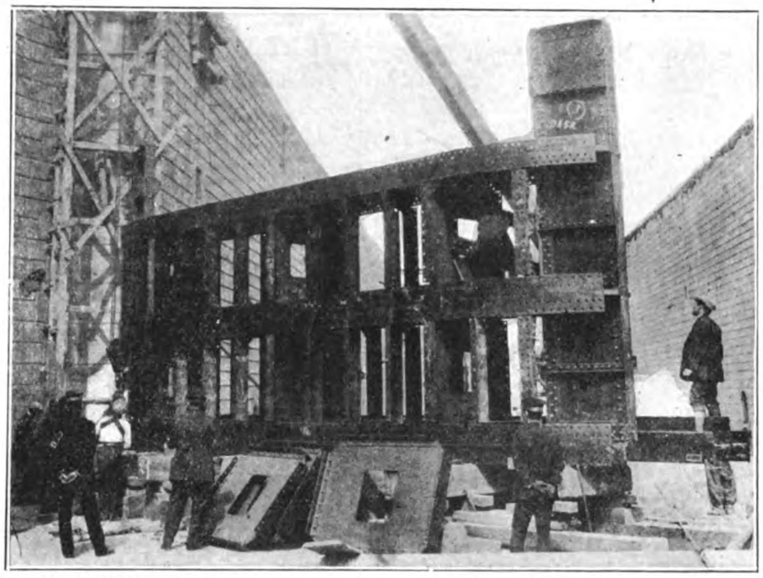

Telephone Exchange at Fusan Post Office

Single control of the railways in Chosen and Manchuria being considered advisable on account of their economic and communicative relations, the government-general, in accordance with the imperial ordinance of the 31st of July, 1917, concluded a contract with the South Manchuria Railway Company and entrusted to it the management of all the state-owned railways in Chosen no and after the 1st of August.

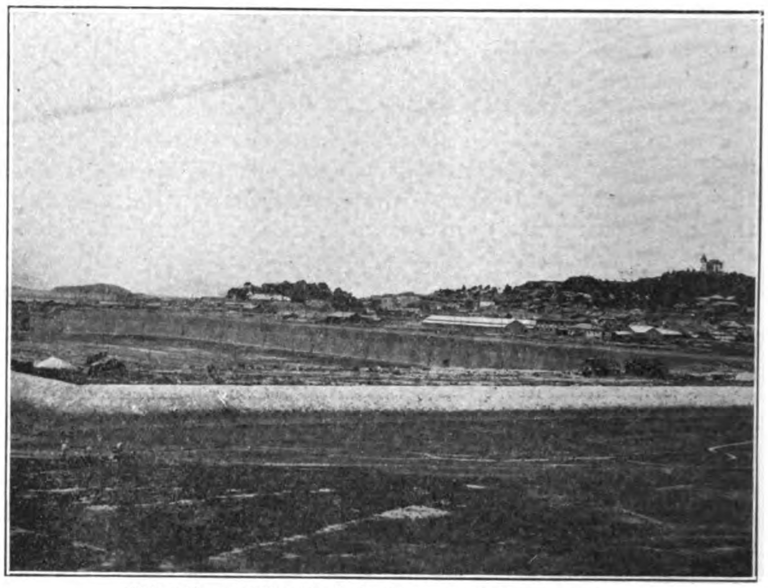
According to the contract above mentioned, the entire management of the state-owned railways in Chosen, except the formation of plans for new construction and improvement and the provision of capital for the purpose of carrying them out, was entrusted to the South Manchuria Railway Company for twenty years, on condition that the net earnings to the equivalent of 6 per cent. on the total amount of capital furnished by the government-general since the fiscal year 1911 were paid over to the government-general each year, and in the event of the profit gained falling short of that amount in any one year the deficit to be made good out of the profits of succeeding years, while should the profit exceed the amount required, half such excess was also to go to the government-general. This arrangement, however, leading to some amount of inconvenience in settling accounts, another contract was concluded between the government-general and the South Manchuria Railway Company on the 23rd of July, 1918, relieving the company from paying over the half of any excess profit obtained but requiring it to bear construction costs.

The railways in Chosen, by bridging the Oryoku and making connection thereby with the Manchuria railway and with European railways by the Chinese Eastern Railway, have become part of the international railway system, and this has resulted in direct communication between Fuzan and Mukden. To further this, the ferry-steamers between Shimonoseki and Fuzan have been made to run more frequently, and direct communication between Japan and Manchuria and between Japan and China, has been established. Though the railway business suffered for a time through the Great European War, it was not long before it regained its former activity, and even surpassed it, owing to the deficiency in bottoms, so that of late years congestion of goods at every station has been the rule owing to the development in productive industry, and this has necessitated increase in the number of locomotives and trucks, and a closer co-operation between the government railways and forwarding agents. The following table gives some idea of the railway development:—

Fiscal Year	Length	Passengers	Freight	Receipts
	Miles	*Miles*	*Tons*	*Yen*
1920	1,157.4	12,421,441	3,186,073	23,816,807
1919	1,153.2	12,184,485	3,642,829	21,635,968
1910	674.6	2,024,490	888,723	4,095,752



Lock Gates in Course of Construction for the Jinsen (Chemulpo) Harbor Works



The Jinsen Wet Dock in Course of Construction

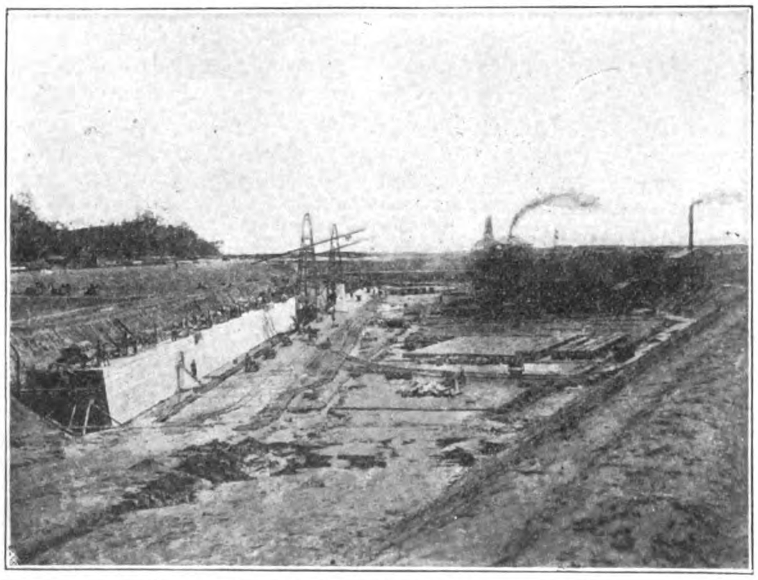
Though railway rates and charges had not been revised since 1912, the increase in expenditure owing to the rise in price of commodities at length required this to be done, but great care was taken to make them no higher than absolutely necessary.

The hotel business as an adjunct to the railway business was first started at Fuzan in 1912 for the convenience of foreign tourists by making use of the upper stories of the station there, and later on in Shingishu. In 1914 the Chosen Hotel was established on a large scale in Keijo, and a branch of it at Kongozan for the convenience of sight-seers there.

Warehouses were established in 1913 at Keizan and ten other places, and as time went on were erected in other important centres. Storage yards were also prepared to cope with the prevailing congestion, and at the present time 67 points along the railways are provided with warehouses or sheds.

As regards new construction and improvement of existing lines, the Kei-Fu line has been continually improved since the fiscal year 1914, while the new lines Taikyu-Kinsen and Taiden-Fuko were completed in the fiscal year 1916, and the Kinsen-Taiden in the fiscal year 1919, while the new line between Soryo and Fuzanchin and that near Keijo are now in the course of construction. The Kankyo line in the north-east between Genzan and Kwainei totals over 376 miles in length and has a branch line running between Yujo and Seishin. Of this the parts between Genzan and Eiko and Seishin and Kwainei were completed in 1916 and 1917 respectively, between Eiko and Kanko and Yujo and Ranan in 1919. In the west the Keijo colliery railway bought the line between Birin and Shokorai from the Onoda Cement Company and opened it to business in 1918, and the Konan line started work on a track between Taiden and Moppo and between Riri and Gunzan in 1910 and opened both to business in 1914.

Of the lines now in the course of construction or projected for future construction, the Kankyo line will be completed in the fiscal year 1926, the Chinkai line in the fiscal year 1925, the new line between Heijo and Genzan will soon be begun, and a double track between Keijo and Fuzan and between Keijo and Shingishu will be laid, and new lines between Kanko and Manpochin, Bazan and Shoteiri, Genzan, Koryo and Fuzanchin, Keijo and Koryo, and Shinanshu and Kokai, started as soon as financial conditions will allow.



Construction Work on the Chinnampo Harbor

(2) Private Railways and Tramways

For the encouragement of private railways and tramways, the government-general promulgated the Chosen light railways regulations in 1912, making provisions for their supervision and protection, and since then has annually sent officials to investigate projected private railway lines. In the fiscal year 1914 it also made provision for granting subsidies to important lines to meet any deficiency in profit below a certain percentage on the paid-up capital of the company favored.

Up to 1917 the rate was 6 per cent., and this was raised to 7 per cent. in 1918 and to 8 per cent. in September, 1919. On the reforms in the government organization being effected, new regulations relating to the subsidies to be granted them were drawn up and were promulgated at the end of the fiscal year 1920.

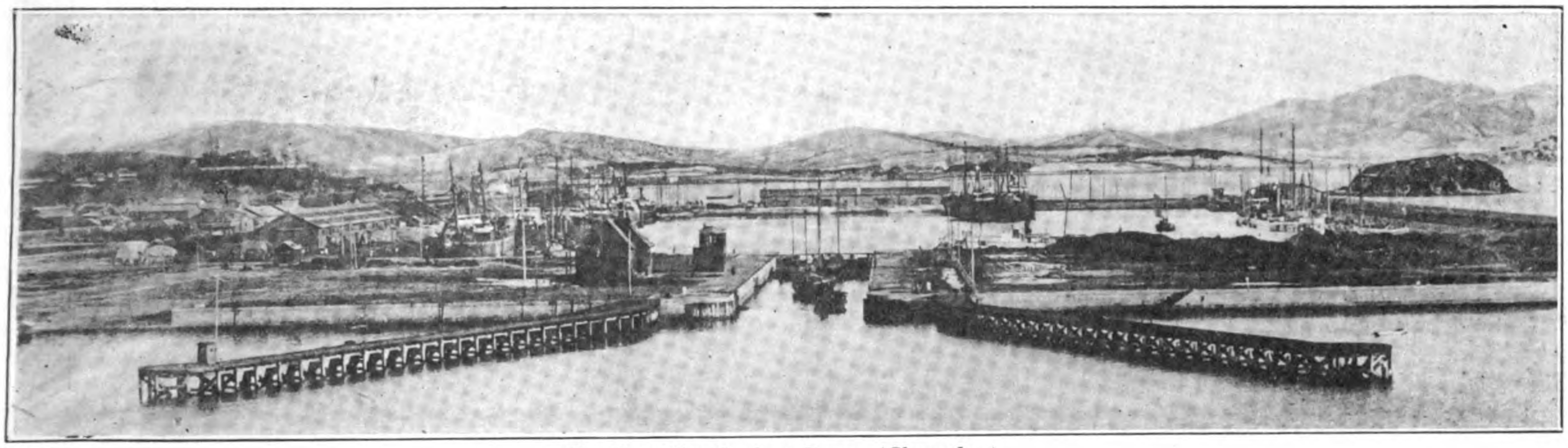
As the light railway regulations also required revision owing to the progress of the times, the Chosen private railway regulations were published in June, 1920, limiting the motive power to steam and electricity, and determining the gauge at 4-ft. 8.5-in. as a rule. They also provide for making increase in capital, floating debentures, amalgamation of companies and various other matters.

Factories

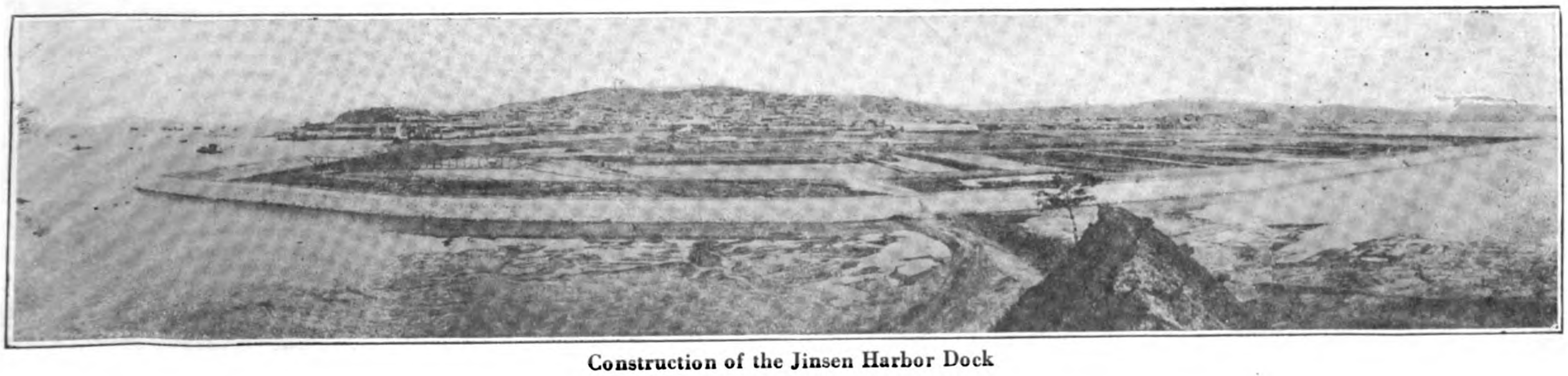
Except for some few run by Japanese and foreigners, factories on modern lines were practically non-existent in Chosen prior to the great European war, but the abnormal conditions induced by that war quickly brought about a change, and the 328 factories with an aggregate capital of Y.13,000,000 existing in 1912 increased to 1,700 in 1918, and to 1,900 in 1919 with an aggregate capital of Y. 129,000,000. In the following table are ennumerated the most important manufacturing companies established in

HARBOR CONSTRUCTION IN KOREA

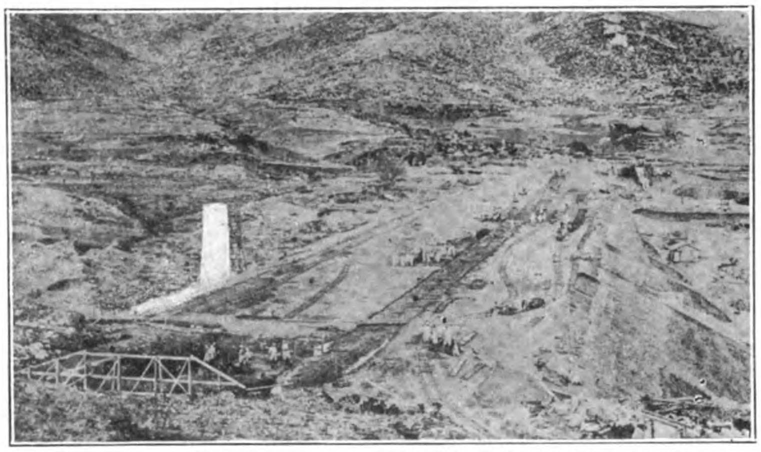
The New Pier and Railway Terminus at Fusan



The New Wet Dock at Jinsen (Chemulpo)



Construction of the Jinsen Harbor Dock



Reservoir of Chinnampo Waterworks in Course of Construction

Reservoir of Fusan Waterworks in Course of Construction

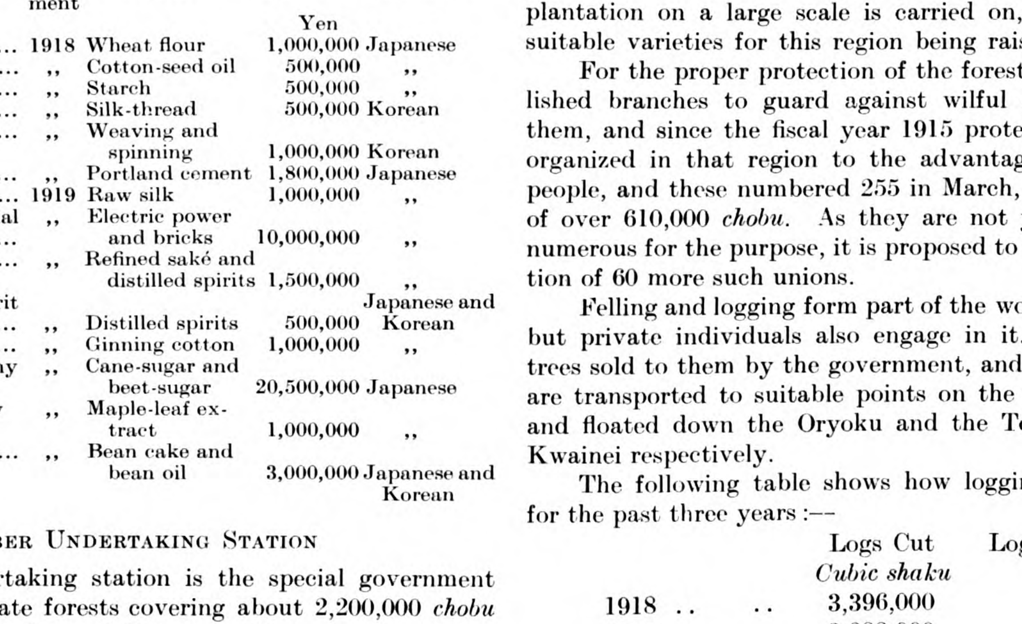
1918 and 1919 with a capital of Y.500,000 or more :—

Name of Factory	Year of Establishment	Output	Capital	Composition
			Yen	
Chosen Flour Company ...	1918	Wheat flour	1,000,000	Japanese
Chosen Oil Company ...	,,	Cotton-seed oil	500,000	,,
Chosen Starch Company ...	,,	Starch	500,000	,,
Keijo Reeling Company ...	,,	Silk-thread	500,000	Korean
Keijo Spinning Company ...	,,	Weaving and spinning	1,000,000	Korean
Onoda Cement Company ...	,,	Portland cement	1,800,000	Japanese
Chosen Raw Silk Company ...	1919	Raw silk	1,000,000	,,
Chosen Electric Industrial Company	,,	Electric power and bricks	10,000,000	,,
Asahi Brewing Company ...	,,	Refined saké and distilled spirits	1,500,000	,,
Chosen Distilled Spirit Company	,,	Distilled spirits	500,000	Japanese and Korean
Seisen Ginning Company ...	,,	Ginning cotton	1,000,000	,,
Dai Nippon Sugar Company	,,	Cane-sugar and beet-sugar	20,500,000	Japanese
Mansen Dye-stuff Company	,,	Maple-leaf extract	1,000,000	,,
Chosen Fertilizer Company ...	,,	Bean cake and bean oil	3,000,000	Japanese and Korean

(3) Lumber Undertaking Station

The Lumber undertaking station is the special government office controlling the state forests covering about 2,200,000 *chobu* in the basins of the Oryoku and Toman, and engages in various kinds of work tending not only to improve the forests themselves but to improve their indirect utilization.

The principal trees in the forests are mostly those found in the frigid zone, such as the larch (larix davurica var. principis-ruprechtii), fir (picea jezoensis and abies holophylla), birch (betula schmidtii), and aspen (populus tremula and populus suaveoleus), all valuable for utilitarian purposes.



Reservoir aud Pumping Station of the Keijo Waterworks

The investigation of the forests, undertaken as a ten-year consecutive work from the fiscal year 1913, consists of two kinds, that is, investigation of the boundaries of the state forests under the control of the station, and investigation regarding their afforestation, and of the former 1,780,000 *chobu* and of the latter over 910,000 *chobu* had been worked over by March, 1910.

As for afforestation, not only is the natural way utilized but plantation on a large scale is carried on, seedlings of the most suitable varieties for this region being raised in special nurseries.

For the proper protection of the forests the station has established branches to guard against wilful damage being done to them, and since the fiscal year 1915 protection unions have been organized in that region to the advantage of both officials and people, and these numbered 255 in March, 1920, guarding an area of over 610,000 *chobu*. As they are not yet thought sufficiently numerous for the purpose, it is proposed to encourage the organization of 60 more such unions.

Felling and logging form part of the work done by the station, but private individuals also engage in it. These have standing trees sold to them by the government, and the logs made by them are transported to suitable points on the rivers and there rafted and floated down the Oryoku and the Toman to Shingishu and Kwainei respectively.

The following table shows how logging has been carried on for the past three years :—

	Logs Cut	Logs Arriving at Station
	Cubic shaku	*Cubic shaku*
1918	3,396,000	3,840,000
1919	3,888,000	3,480,000
1920	2,796,000	3,240,000

Preparing timber was first done by private mills under contract, but as this proved unsatisfactory to the contractors and was uneconomical to the station, a saw-mill was bought by the station in Shingishu, the seat of the station itself, in 1909 and enlarged, and was found of great assistance in keeping a happy mean between the supply and demand of timber in Chosen.

Timber prepared by the station finds its market mostly in Chosen, but a small demand for piles and sleepers comes from Manchuria. Even in Chosen it was at first prepared only for the use of government offices, but of late years it has become recognized as of ex-

cellent quality and, the credit system being introduced, the demand increased so much, especially on account of the boom induced by the great war, that the station began to find it impossible to meet it, but in 1920 the demand waned somewhat owing to the depression in economic circles.

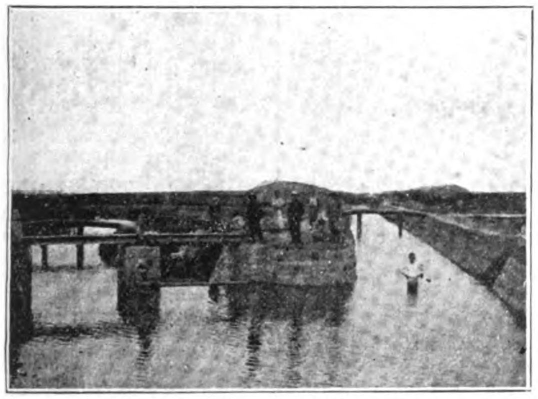
The following table gives the quantity of prepared timber and the receipts from connected sales:—

	Quantity of Timber	Receipts from Sales
	Cubic shaku	*Yen*
1918	1,884,000	2,251,000
1919	1,956,000	2,935,000
1920	1,548,000	2,623,000

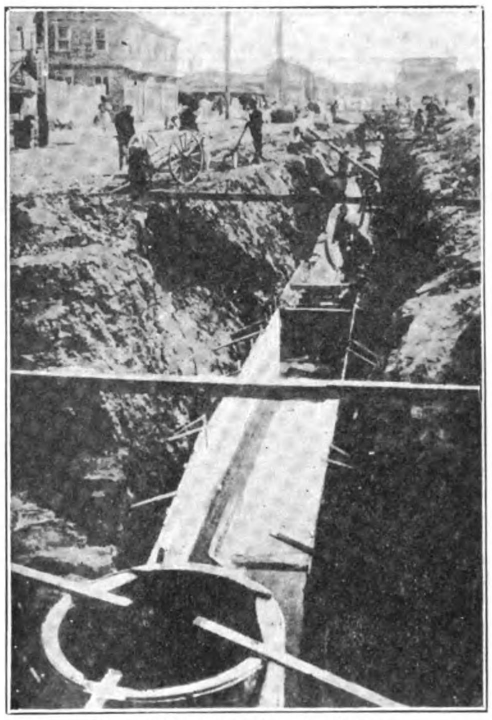
This undertaking was originally jointly financed by the Japanese and the Korean governments under the management of the resident-general. After the annexation the government-general took it into its own hands and made great improvement in its efficiency, and in the fiscal year 1918 secured from it a profit of Y. 940,000 a really amazing increase compared with the Y. 80,000 in the fiscal year 1910.

(4) Heijo Coal Mine Station

The Heijo coal mine station is actually engaging in the mining of anthracite coal in Jido and Kozanbo in Daido district, Heian-Nan-do, the coal-beds covering about 124 square *ri*. As there is not as yet a very general demand from the people for such coal, it is mostly disposed of to the naval briquette factory at Tokuyama in Yamaguchi prefecture, Japan proper, the



Irrigation Canal, Korea



Sewer Construction in Keijo

rest being sold to the public in the form of briquettes. As the coal-fields cover so large an area, there has recently been granted mining rights over some part of it to various mining companies, and the actual area retained by the station itself has been reduced to 47,000,000 *tsubo*, the amount of coal that can be safely mined being estimated at 66,000,000 tons. The coal mined by the station is almost all dust, containing over 8 per cent. of volatile matter and over 82 per cent. of fixed carbon, its calorific intensity being rated at 8,000 calories.

The undertaking was begun in 1902 and was taken over by the government-general in 1910, and between 1909 and 1911 the equipments in the mining districts at Kobozan and Jido were enlarged, and, on the demand for dust and briquettes increasing, extension works were begun in part of Kobozan and in Ritsuri and Butsudori in July, 1917, and being completed in March, 1920, it is estimated that the annual production of coal at full working capacity is 300,000 tons, as against a former output of some 100,000 tons.

The station has also a briquette factory at Jido with a capacity of 100 tons a day. The manufacturing of briquettes by the government was started in 1911, and two kinds of briquettes of small size are turned out by it for use in stoves and fireplaces, and *ondols* and kitchens, and the demand for them is increasing year by year. It is now planned to turn out a large size for use on the railways.

The annual production of coal by the station was at first not more than 40,000 to 50,000 tons, but the demand by the navy increasing, it rose to about 120,000 tons, and on Japan joining the allies in the great European war rose to as much as 150,000 to 180,000 tons, but this decreased somewhat when the war came to an end. The annual production of briquettes was at first not more than 5,000 to 6,000 tons, but as recognition of their convenience in use became more general this too increased and is now over 20,000 tons.

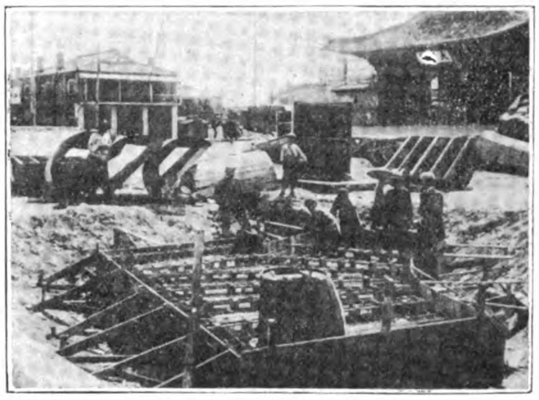
The following table shows the production and receipts from it for the last three years:—

	Output	Briquettes	Total Receipts	Net Profits
	Tons	*Tons*	*Yen*	*Yen*
1918	140,773	20,043	1,015,898	162,334
1919	128,274	24,187	1,599,241	167,063
1920	140,250	15,542	2,982,380	299,773

The coal-fields belonging to the station have been thoroughly investigated by various methods since the beginning of the undertaking, and similar work since carried on relates to the whereabouts of rocks and of seams lying deep in the ground.

(3)) Agricultural Water-utilization

As for water-utilization in Chosen, thanks to the regulations relating to water-



Sewer Construction, Keijo

utilization associations promulgated during the protectorate *régime*, and the protection and control of private irrigation undertakings since the establishment of the government-general, dependence upon rain-water, which was all but general before the annexation, waned so much that at the end of the fiscal year 1918 twenty per cent. of the total area of 1,544,000 *chobu* of paddy-fields, or about 328,000 *chobu*, was provided with irrigation arrangements, of which 289,000 *chobu* were irrigated by ponds and dams, 31,000 *chobu* by water-utilization associations, and 7,000 *chobu* by private works. The remaining 80 per cent. depends entirely upon rain-water, and produces only 1 *koku* per *tanbu* even in a most successful year, such as 1918 was, that is, only half the yield obtained in Japan proper, so the encouragement of water-utilization associations is being vigorously pursued.

The irrigation ponds and dams existing in former times numbered over 6,000 and 20,000 respectively, but so consistently had they been neglected that they were all but worthless, so subsidies were given from 1909 to 1918 to encourage their repair and maintenance in good order, with the result that 1,527 ponds and 410 dams have been rendered serviceable once more. Since the fiscal year 1919 the policy of making the local revenues bear the burden of restoring them has been pursued.

In 1920 the government-general drew up a program to be executed in 15 years from that year, and is now actually at work on it. This program aims at the improvement of one-half of the total area of uncultivated lands amounting to 800,000 *chobu*, as well as of paddy-fields and lands capable of being turned into paddy-fields.

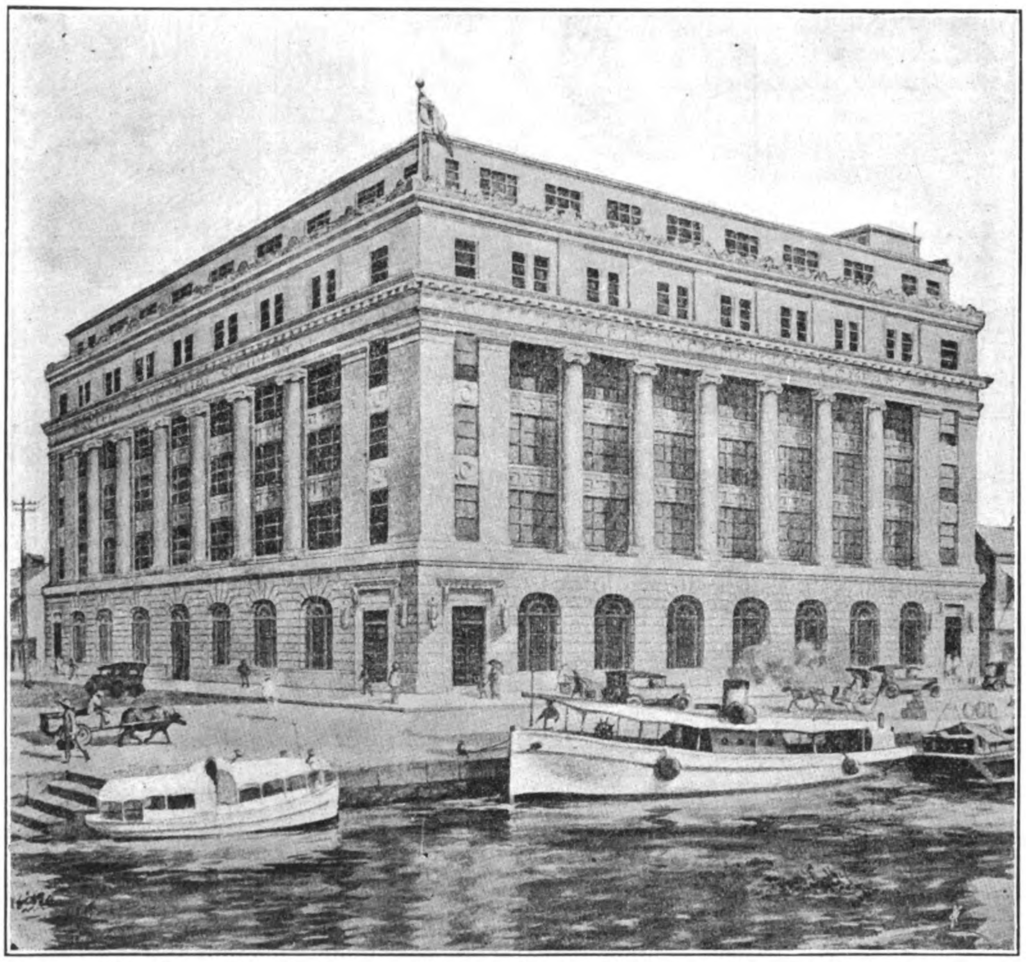
Undertakings for irrigation appeal to the common interest of agriculturists and visibly illustrate the convenience afforded by water-utilization associations, so the government-general is encouraging their formation, while it also recognizes private undertakings. Since undertakings of this kind affect people in various ways, however, the government-general has made it a rule that permission for such must first be obtained, and the number of permissions already granted is 74, affecting an area of over 8,200 *chobu*.

The New Pacific Building, Manila

THE new Pacific building at Manila is the property of the Pacific Building Company, the principal stockholders of which are the International Banking Corporation and the Pacific Commercial Company.

Occupying about 1,800 square metres of irregularly-shaped ground, it has a frontage of 140-ft. on calle General Luna and 150-ft. on Muelle de la Industria, along the Pasig river. With its five-story frontages relieved by majestic columns and the artistic details of the design standing out prominently, the building is a fine sight from any part of the Pasig river section.

In many respects the building is a model of modern building practice. Many features that have hitherto been unknown in Manila are incorporated in it. Take for instance the plastering on the walls. It had never been done before. There was no argument against it but that. The interior walls of the building are finished in fine, smooth, white plaster, just like in the United States. A prominent feature of the interior is the ceiling of the lower floor, which is to house the Bank. It is made of moulded plaster of Paris, manufactured right on the ground. The material had never before been employed for this purpose there and it was difficult at first to teach the workmen to make the moulds and attach the casts.



The New Pacific Building at Manila. Murphy, McGill and Hamlin, Architects

Light and air have been assured for all office space by the careful distribution of area and court spaces. The P. C. C. premises on the fourth and fifth floors are all open, undivided by partitions. One large room is being made into a sample room. It has glass sides and will afford a good display of goods at all times in natural light. To provide for dark, rainy days, an invisible lighting system is installed throughout. One of the most noteworthy features of the building is its sanitary and thoroughly equipped wash rooms and toilets. The plumbing throughout the building is open and easily accessible. Mail chutes are on hand on each floor.

On the ground floor of the building is a pumping plant worked by compressed air which will carry the city water to the fifth and sixth floors, as the gravity system often does not reach beyond the fourth floor. This pumping installation can be used for the lower floors if needed.

Six elevators are provided for, but only four of most modern type have been installed. They are equipped with automatic safety doors, handsomely finished in bronze, which make it impossible to operate the cars until the doors are closed. This system is sure to prevent accidents. Two large shafts are used for freight hoists, consisting of blocks and tackle capable of lifting a ton at a time.

A special type of window sash has been installed throughout the building, eliminating much wooden construction and affording perfect ventilation and protection against the elements. All doors are of heavy native hardwood, brilliantly polished. The office of the general manager is entirely panelled in the best variety of Philippine hardwood. On the floors are laid thick battleship linoleum. A composition called durostone will be used to finish the ground floor walls. Marble is employed throughout the building for thresholds and ornamental slabs.

The International Banking Corporation quarters will be particularly handsome in finish and equipment, no expense having been spared in this respect. When completed, the Bank's premises will stand comparison with the finest at home or abroad.

Murphy, McGill and Hamlin, of New York and Shanghai, are the architects. They are represented on the ground by H. H. Keys. Oscar F. Campbell is the contractor and S. D. Rowlands, the structural engineer. The cost of the building alone, without the land, is P.2,000,000.

Head Office of the Hokkaido Colonial Bank at Sapporo

Industry in the Hokkaido

THE 1921 report on industrial conditions in the Hokkaido show that the total value of all products that year amounted to more than Y.150,000,000. In 1914 their value was only Y.28,700,000. The increase in value of industrial products is far greater than the increase in the value of agricultural products for which the Hokkaido is principally noted. The great industrial progress is due to the plentiful supply of raw materials from land and sea, combined with a cheap and plentiful supply of coal.

The principal industry in the Hokkaido is the manufacture of foreign and Japanese paper. The leading foreign paper mills are the Ikeda Mill of the Oji Paper Manufacturing Co., and the Ebetsu, Kanayama and Kushiro mills of the Fuji Paper Mill Co. The principal manufacturers of Japanese papers are the Kita Nihon Paper Manufacturing Co., Ltd., the Hokkai Paper Manufacturing Co., Ltd., and the Hakodate Paper Manufacturing Co., a limited partnership. The Oji and Fuji companies produce principally newsprint, supplying more than 85 per cent. of the total demand in all Japan. Their last year's production amounted to more than 200,000,000 pounds, valued at about Y.20,000,000.

The production of the Japanese paper manufacturers does not fill the demand for such paper in the Hokkaido alone. What they do not supply is imported from the northern prefectures of Japan proper. The great progress in the manufacture of foreign paper and pulp in the Hokkaido is due to the great supplies of timber and coal, and abundant hydro-electric power.

Next to paper in order of importance come fertilizers, sugar, oak bark tanning, fish and vegetable oils.

Superphosphates are manufactured in the Hokkaido and ammonium sulphate is produced from atmospheric nitrogen. Superphosphates are manufactured by the Dai Nihon Jinzo Hiryo K.K. (Dai Nihon Artificial Fertilizer Co., Ltd.), Hakodate Factory, and the ammonium sulphate is produced at the Tomakomai factory of the Denki Kagaku Kogyo K.K.. (Electro-Chemical Industrial Co., Ltd.) The total production of fertilizers in 1921 was 1,500,000 *kwan* (8.28-lb.), valued at Y.4,000,000. Before the war at the end of 1914, only half of this amount of fertilizer was manufactured, valued at less than Y.800,000.

Beet Sugar Industry

Many years ago beet sugar raising was begun in the Hokkaido, but it proved unsuccessful. In 1919, however, two companies were organized to plant sugar beets and extract sugar. The Hokkaido Beet Sugar Co., Ltd., capitalized at Y.10,000,000 has a factory at Obihiro, and the Nihon Beet Sugar Manufacturing Co., Ltd., owns a factory at Shimuzu, but because of financial difficulties business has not been very prosperous these past two years, but with the revival of good conditions an increasing acreage is being planted to beets every year. The future of this industry is very promising.

Oak Bark Tanning

The Nihon Hikaku K.K. (Nihon Leather Co., Ltd.) has a tanning factory at Ikeda, and the Nitta Obikawa Seizosho (Nitta Leather Belt Manufacturing Co.) operates one at Tokachi. There is a plentiful supply of oak bark in the Hokkaido, and the industry is not an unpromising one despite present difficulties, caused by over-extension during the war.

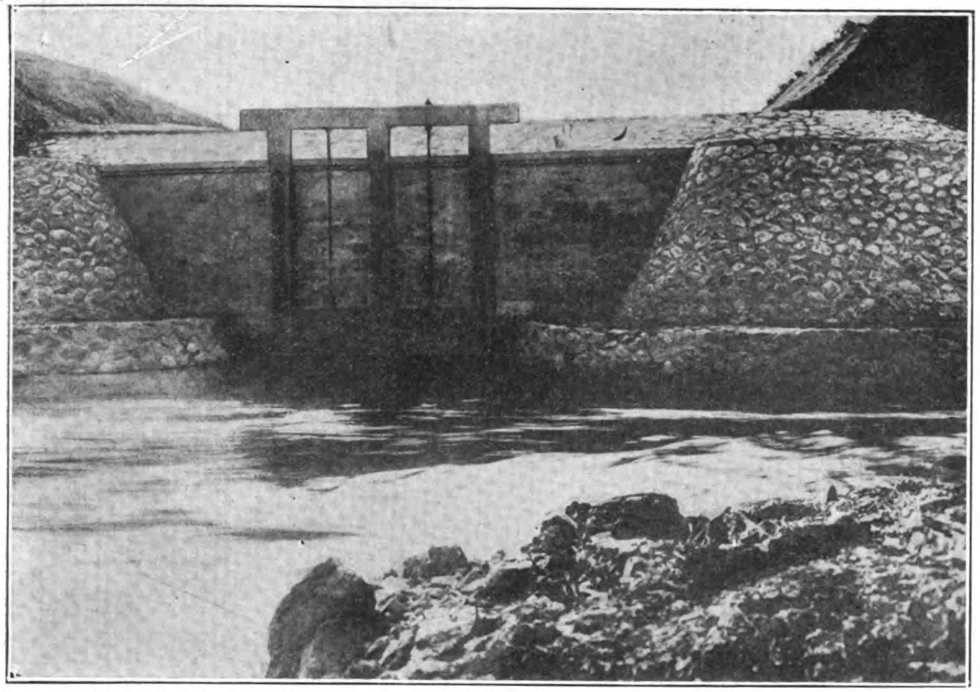
Fish Oil Manufacture

The principal oils pressed in the Hokkaido are codfish, cod liver, whale, and rape seed oil.

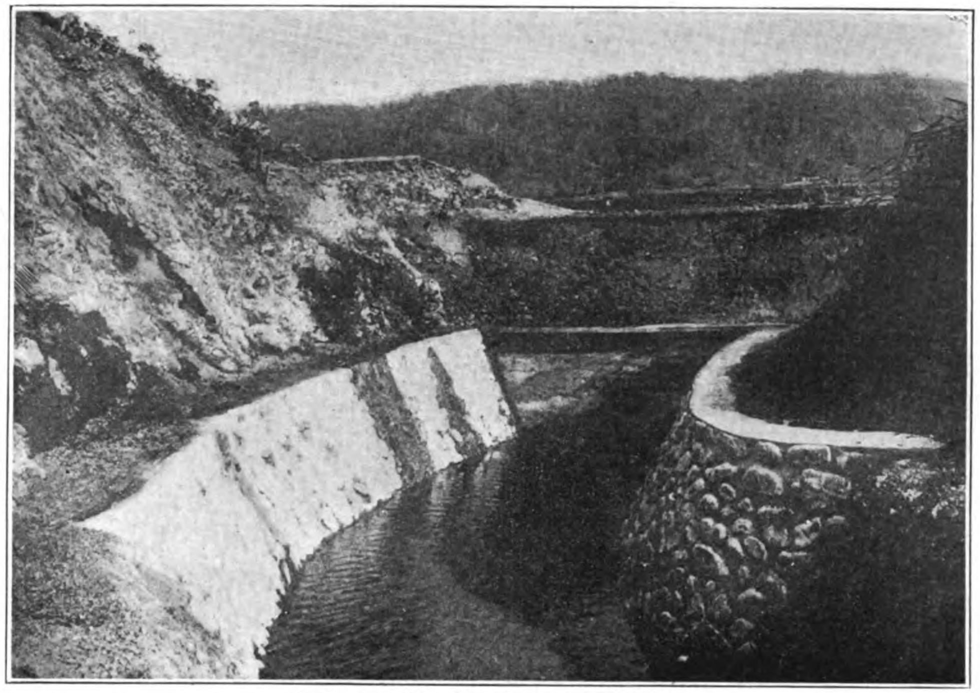
The larger part of the oil extracted is shipped to Japan in its crude state for refining. In 1914, the production of fish oil was valued at Y. 370,000. It had not increased to any great extent by the end of 1920, when it was worth only Y.380,000. The output of whale oil in 1914 was valued at Y.110,000, but in 1920 it had fallen to only Y.45,000.

HOW JAPAN IS DEVELOPING THE HOKKAIDO

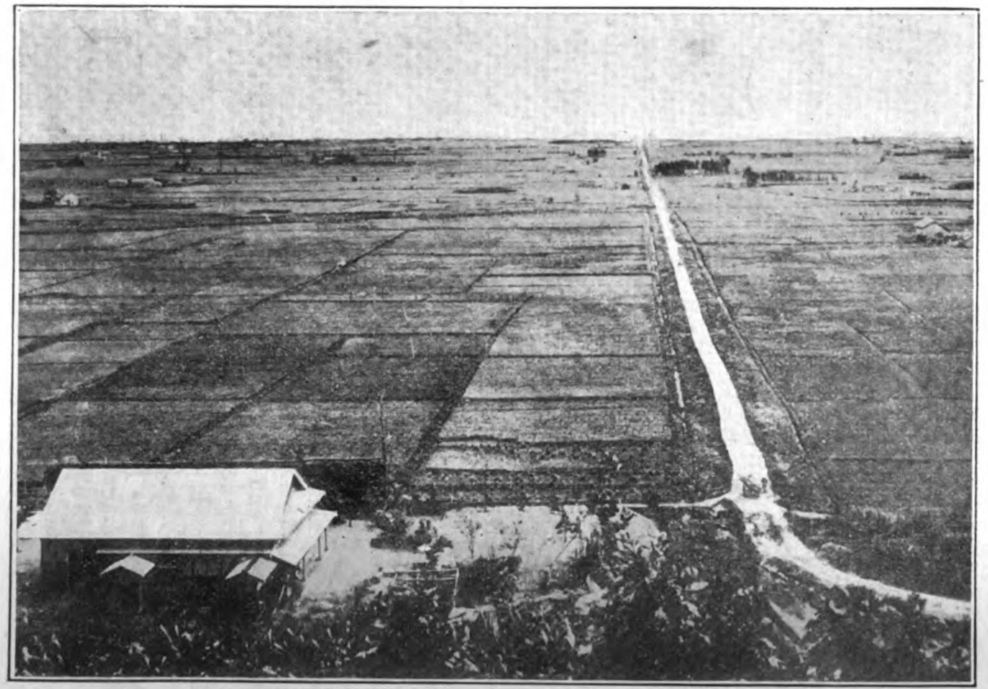
VIEWS OF THE IRRIGATION SYSTEM



Sluice Gate of the Hokuryu Doko Guild at Hokuryu Mura, Ishikari Prefecture



Irrigating Canal of the Hokuryu Guild



Irrigated Farm Land in Magayama-Mura, Ishikari Prefecture

The Crop from an Irrigated Alfalfa Field, near Sapporo

HOKKAIDO IS THE CENTRE OF A GREAT FISHING INDUSTRY

The Herring Catch at Yoichi, Shiribeshi Prefecture

Catch of Herrings at Oshoro, Shiribeshi, Prefecture

The Hokkaido has an extensive coast line, 1,355 nautical miles, and the supplies of fish along its sea-coast are almost inexhaustible. The reason the industry has made but little advance in these past eight years is because it is not carried on in a large way. There is a great future for a company organized to press oil on a large scale with modern machinery.

Besides these industries, there are cement, brick, glass, earthenware, pottery, shipbuilding, iron works, and other enterprises in the Hokkaido. Hemp spinning and rope manufacture has increased, and the breweries, flour mills and canning companies are making favorable progress. Industry in the Hokkaido is prosperous because its products are supplied principally to the local markets, where the demand is greater than the local manufactures can supply. There is much room for expansion of industry, especially as the resources of the Hokkaido have hardly been scratched.

Marine Transportation

Marine communication from port to port in the Hokkaido and between the Hokkaido and the main island of Japan is carried on by the Kurabayashi Shosen K.K., the Kita Nihon Kisen K.K. and the Nippon Yusen Kaisha. Since the domestic and foreign departments of the N.Y.K. have become independent of one another, great attention has been paid to the development of periodical services in the coasting trade, especially in the Hokkaido. The N.Y.K. operates the following lines to the Hokkaido and north :—

Hakodate to Karafuto, in summer only	88 trips a season.
Otaru to Karafuto, in winter only ..	20 ,, ,,
Hakodate-Abashiri-Kurile Islands ..	76 ,, ,,
Kobe-Kushiro	18 ,, ,,
Yokohama-Karafuto	14 ,, ,,

Twelve of company's fleet are operated on these routes, in addition to several chartered vessels of 1,500 to 3,200 tons.

A new passenger steamer was recently built for the company, called the *Chitose Maru* of 2,670 tons. It is furnished with wireless and ice breakers. Special attention has been paid to accommodation for third-class passengers.

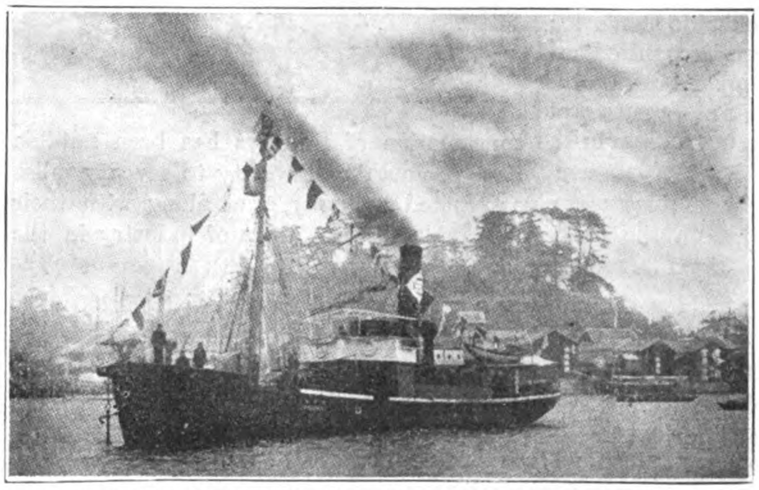
Until a few years ago steamers in the Hokkaido service were of less than 1,000 tons, but the growing business induced the N.Y.K. to build and operate a better type of vessel. The future of this transportation is very promising.

Kamchatka is not only a very profitable field of business for the canning industry, but lumber, petroleum and gold are expected to add to the wealth of this region. Lack of proper communication has kept Japanese capital from developing these resources, but with the extension of regular steamship services during the summer season, Kamchatka is expected to develop rapidly.

The Kuribayashi Commercial Steamship Co., Ltd., operating about 140,000 tons of vessels, with Muroran as the centre of its activities, engages in regular or occasional services to Saghalien, Nikolaevsk, Vladivostok, North and South China ports, the Yangtze river and Chosen. The company was established in April, 1919, taking over the shipping department of the Kuribayashi Gomei Kaisha. It is capitalized at Y.2,000,000, all paid up. Its main office is No. 1 Minami Nabe Cho, Kyobashi Ku, Tokyo, with branches at Muroran, Kushiro, Hakodate, Otaru, Yokohama, Osaka, Moji, Tsingtau and Shanghai. The fleet owned by this company consists of 11 steamships, aggregating 25,568 tons.

Besides these steamers it operates the *Hidaka Maru*, of 5,500 tons, chartered from the government. In September, 1919, this company had under charter 72 vessels of more than 148,200 tons. In March, 1920, it had only 48 vessels, tonnage 80,830. In May, 1921 only 25 vessels were chartered with a total tonnage of 52,000. But in June 1922, there was an increase in the number of vessels to 42, and in tonnage to 110,400 tons. The chartered vessels are used in freight transportation only. At present this company is operating 54 vessels of 142,400 tons.

The principal cargo is fish. With the opening of the fishing grounds in Kamchatka, the Kuribayashi Shosen Co. engages in the transportation of materials for the canneries, and the canned fish back to Japan and to China, from the early spring to the closing of the ice pack. About 70 per cent. of the total freight traffic of this company is carried in connection with the operations of the fishing companies in Kamchatka. During the fishing season the tonnage operated rises to more than 150,000 tons. The irregular services of this company cover practically the entire Far East. Its greatest endeavors are made to increase the shipment of marine products, and lumber to the Chinese markets from the Hokkaido.



A Steam Whaler of the Toyo Hogei Company operating in Hokkaido Waters

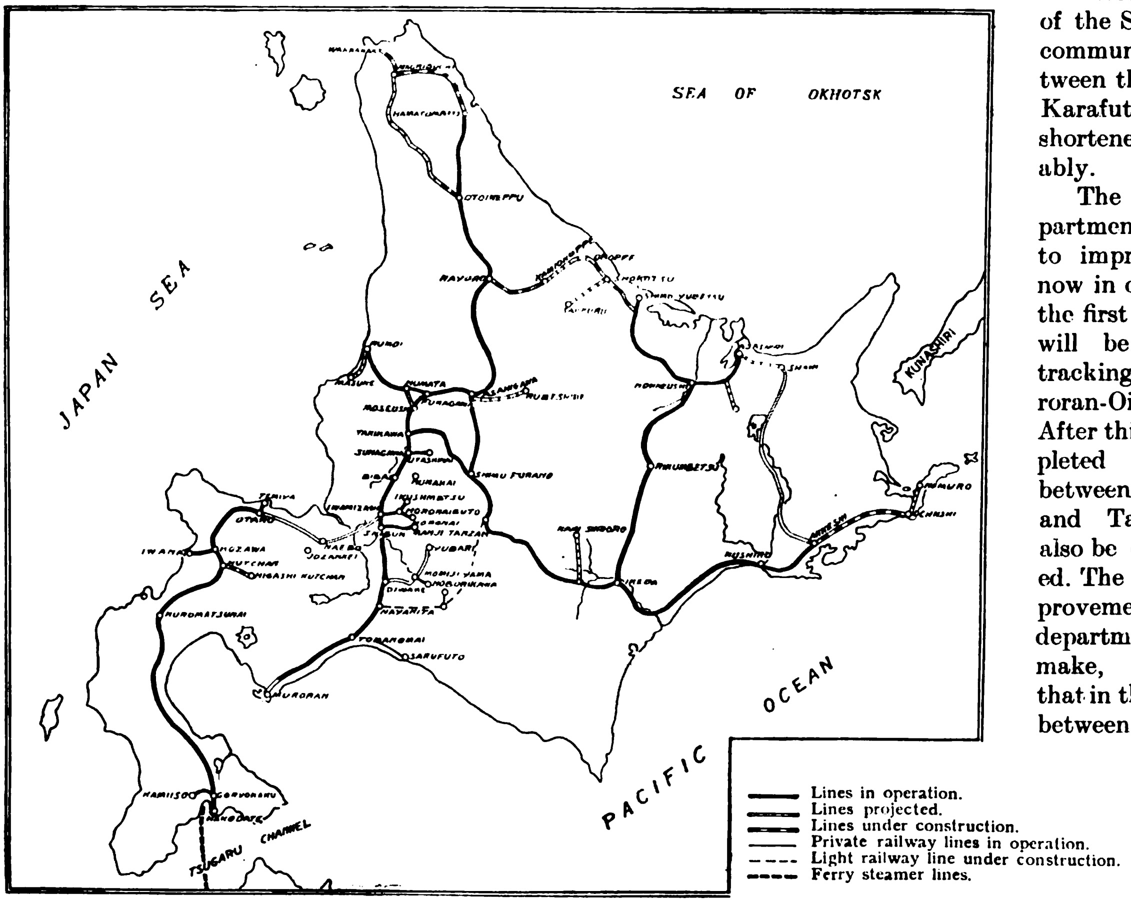
Railways in the Hokkaido

HOKKAIDO, the northern most island of the Japanese main group, is the principal undeveloped agricultural district belonging to the nation. Development, despite rapid progress, has been handicapped by lack of means of communication. Roads are still primitive and insufficient for a growing community and the rivers can be used only for the transportation of timber rafts, the principal wealth of Hokkaido to-day.

The leading products of the Hokkaido, timber and coal, are of such a nature that their successful development depends largely upon railway communication. Because of the lack of organs of communication the inhabitants of the Hokkaido are still obliged to obtain the greater part of their rice and salt from Japan proper, selling in exchange their crops of miscellaneous cereals. Consequently, the shifting of cargo has become greater and greater every year necessitating the extension of existing railway lines and showing very plainly the need of new ones.

Conditions of communication being such as they are colonists are unwilling to settle in remote places and the agricultural and industrial development in general is retarded more and more every year.

In the past whenever it was announced that any particular part of the Hokkaido would be tapped by a railway line the price of land, and land for agricultural purposes, forests and mountainous districts even, would rise by leaps and bounds, as settlers have always been attracted where there is easy means of communication.



The needs of the Hokkaido have long been recognized and compared with other parts of Japan a rapid rise in progress in the construction of railways has been notable during the past five years. Something like sixty to seventy miles of new railway are constructed annually, and along with their operation the most remarkable developments of industry in the Hokkaido have taken place.

To-day the imperial government railways operates 1,200 miles of lines in the Hokkaido. These are the trunk lines which connect the north with the south and the east with the west. In all Japan, including the Hokkaido, the imperial government railways operates 6,300 miles, so that the undeveloped Hokkaido alone contains one-fifth of all Japan's official railway mileage. There are five private railways, including light railways, in the Hokkaido which operate sixty-four miles of line.

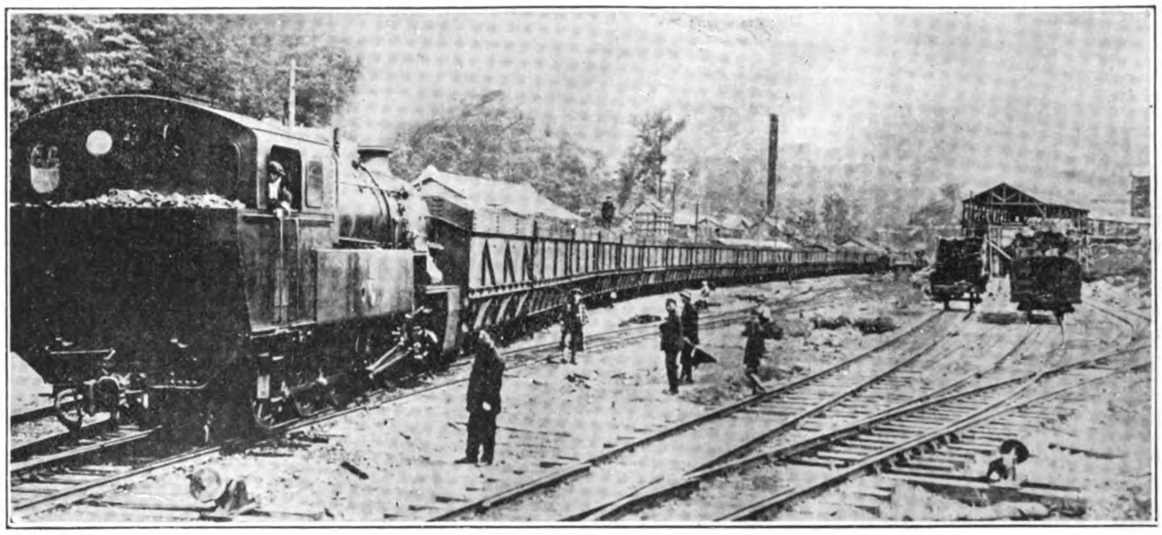
The imperial government railways project the construction of the following lines during the next six years, viz. :—

Names	Distance	Projected date of completion
Soya Line ...	Kishibetsu—Wakanai	1922 do.
Rubeshibu...	Shin Asahigawa—Rubeshibe	1923 „
Shokotsu ...	Shokotsu—Sakkuru	„ „
Teshio ...	Otoishifu—Kabaoka	1924 „
Aioi ...	Bihoro—Aioi	„ „
Kamishihoro	Obihiro—Joshihoro	„ „
Kushiami ...	Kushiro—Abashiri	1926 „
Chorin ...	Nagamabe—Wanishi	„ „
Hahoro ...	Rumoe—Hahoro	1928 „
Uryu ...	Fukagawa—Uryu	„ „
Engaru ...	Rubeshibe—Engaru	„ „
Setana ...	Kuninui—Setana	„ „
Hyocha ...	Hyocha—Hishikawa	„ „

With the opening of the Soya line, the communication between this island and Karafuto will be shortened considerably.

The railway department also plans to improve the lines now in operation and the first of this work will be the double tracking of the Muroran-Oiwake line. After this line is completed the distance between Iwamizawa and Takigawa will also be double-tracked. The principal improvement that the department desires to make, however, is that in the connection between Hakodate in the Hokkaido and Aomori, the terminus of the main line between Tokyo and the north on the main island. Between the two ports in the past it has been necessary to transfer all passengers and all freight either port. The improvement planned consists in the operation of four ferry boats on which both passenger and freight trains can be transported across the straits. Two of these ferry boats have been ordered, and it is announced that they will soon be completed and put in operation.

One of the great industries in the Hokkaido is fishing, and the supplies of fresh fish on the main island are always below demand. In order to transport fresh fish from the Hokkaido to the district around Tokyo, the railway department has placed an order for many refrigerator cars, something which has not yet been seen in Japan. One thousand five hundred freight cars are also under construction for use in the transportation of timber only.



Bibai Coal Mine Station of the Bibai Railway in the Hokkaido

The Locomotive drawing 80 loaded Coal Cars was made at the Kobe Works of the Mitsubishi Zosen Kaisha, Ltd.

From the point of view of passenger traffic, the Hokkaido is rich in beautiful scenery and there are many famous hot springs which attract visitors at all times of the year.

Private Railways

There are five private railways in the Hokkaido, the Bibai, Tomakomai, Jozankei, Noboribetsu and Sutsu railways. The Hokkaido Kogyo Tetsudo Kabushiki Kaisha (The Hokkaido Mining and Railway Company, Limited) will shortly open a new line. The government of the Hokkaido recently granted a subsidy of seven per cent. of the paid-up capital of all private concerns which would undertake railway operation on that island. It is expected that this assistance will materially expedite the construction of railways.

Bibai Railway

The Bibai railway runs from Bibai station on the imperial government line to the Bibai coal mine, a distance of five and one-tenth miles. Although the line is comparatively short, it shows the best business results of any of the private companies in the Hokkaido, due largely to the Mitsubishi Bibai coal mine which annually ships from five hundred thousand to six hundred thousand tons of coal over the railway. The mine is planning to greatly increase its production.

The immense Bibai coal deposit, purchased by the Mitsubishi Mining Cmpany in 1920 from Mr. Entaro Iide, is of an exceedingly good quality. Its present output of six hundred thousand tons is to be increased to a million tons a year. The vertical shafts now being bored will be completed by 1926 and the railway company is preparing to take care of the increased volume of freight.

The standard grade of the railway is $\frac{1}{47}$. Heavy grades are laid with 75-lb. rails with 60-lb. rails on the level. The freight cars are of 24 to 30 tons capacity. There are very few passengers and most of these are miners and the members of their families. The average daily number of passengers is about three hundred. When the mine was at the height of its prosperity in 1920, more than 600 passengers were carried every day.

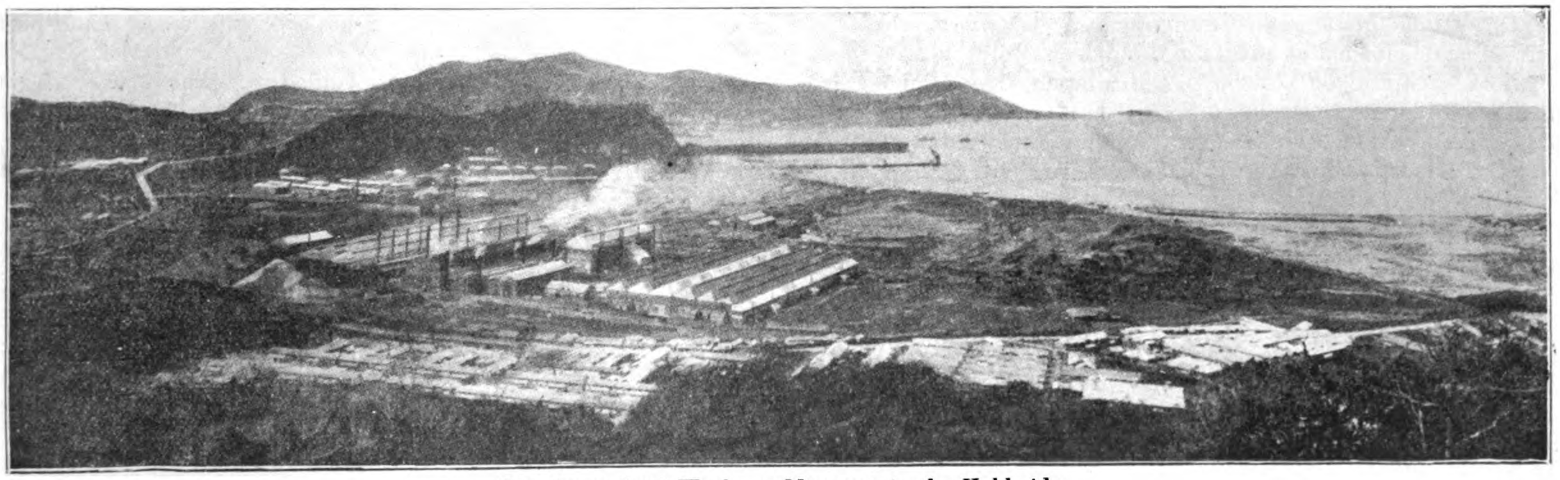
The Bibai Railway Company owns two super-heated freight locomotives and four passenger locomotives of less powerful type.

The railway is closely connected with the Bibai Coal Mine Company being managed by the Mitsubishi. Mr. Ichini Mitani of the Mitsubishi Mining Company, Limited, and Mr. Kame Saburo Ikade, the president of the Bibai mine, are members of the board of directors, but the actual management of the company is in the hands of Mr. Ryoichi Mori, at one time an official of the railway department, who entered the Mitsubishi in 1917, receiving his appointment as manager of the Bibai mine in 1918.

With a capital of Y.1,200,000 paid up, the company has been paying eight to nine per cent. each business term. At the same time Y.60,000 a term has been put in a special reserve for decreasing capital, so that at the end of twenty years the total capital will have been returned.

Sutsu Railway

The Sutsu Railway Company operates a line from the Kuromatsu station of the Hokkaido government main railway to Sutsu-machi, a distance of ten and a half miles. Sutsu-port, the terminal, an important centre of communication by land and sea for several hundred years, is rich in marine products and at one time was very prosperous. When the main railway connecting Otaru and Hakodate was completed, Sutsu was left ten miles away. Frequent appeals were made to the government which declined to build a branch line, so it became necessary to build a private railway in order to keep the town alire. With the help of capita, in Hakodate, the Sutsu Railway Company, Limited, was organizedl The license to construct a railway was granted in February, 1918. and in August 1918,, the company was organized with a capital of



The Japan Steel Works at Muroran, in the Hokkaido

Y.500,000, which has since been fully paid up. The officers of the company are :—

President and Director, Hejiro Sasaki ; Managing Director, K. Hata ; Directors : T. Sakai, E. Hyodo, J. Tsuchiya, K. Inukami and C. Nakada ; Auditors, Z. Tachikawa and T. Umemura ; Advisors, H. Narazaki and K. Okada.

The right of way was purchased and construction commenced in the spring of 1919, and in October, 1920 the line was open to business. Its cost of construction was approximately Y.900,000.

The opening of the line has greatly stimulated business, especially the transportation of fish. There are large farms and rich agricultural and mining districts in the district served by the Sutsu railway. The bay of Sutsu, a fiahing as well as a commercial port, is the only shelterd harbor between Hokodate and Otaru. The authorities are now planning harbor improvements, which will again make Sutsu an important marine transportation centre.

The cost of the construction of the railway line exceeded the capital of the company by more than Y.400,000. This difference was met by a loan from the Hypothec Bank of Japan, at a very reasonable rate of interest.

Jozankei Railway

The Jozankei Onsen K.K. owns the famous hot springs of Jozankei, which failed to attract visitors because of the inconvenience of reaching it. Residents of the town therefore organized a railway company and a line completed in October of 1918, from Shiraishi station on the Hokkaido government railway's main line to Jozankei, passing through Toyohira, a distance of $18\frac{3}{8}$ miles. Since its opening, passenger traffic has increased by ten per cent. each business term and in proportionate manner the general business condition of the company has also improved.

The imperial timber preserves, situated in this railway zone, ship a large amount of lumber. Building stone is also shipped from the Ishikiri mountains. The Hou silver mine belonging to the Kuhara Company is also situated in the railway zone. The future of this line is, therefore, very bright.

The company is capitalized at Y.800,000 fully paid up. Its officers are : President, Motosaburo Kaneko ; Managing Director, Kinzo Oshima ; Directors, O. Kawamura and Y. Nakanishi ; Auditors, Y. Ishida, S. Yoshioka and K. Yamamoto ; Manager, G. Tachibana.

Tomakomai Keiben Tetsudo Kabushiki Kaisha

This railway, operated by the Oji Paper Manufacturing Company, Limited, is the longest private railway in the Hokkaido, running from Tomakomai to Saruta, a distance of 25.1 miles. It was originally constructed to transport the timber necessary for the Oji paper mills. In recent years, however, other freight has been developed and passenger traffic has increased so that the railway has become an extremely prosperous one.

The principal freight is timber, sent down from the logging district of the upper Sariyu River, and landed at Saruta, where it is loaded on the cars for transportation to the Tomakomai mill of the Oji Paper Manufacturing Company. A large amount of charcoal is also loaded at Saruta and Mukawa.

With a capital of Y.500,000, the company has been making a half-yearly profit of more than Y.37,000. During the last term of 1921, the income from passengers amounted to Y.42,400, from freight, Y.158,000, of which Y.56,000 was paid by the Oji Paper Manufacturing Company.

This railway is the only means of communication with the Hitaka district. A number of branches are being planned to connect with this line. One of the schemes is a new company, to be called the Saru Tramway Company, Limited, capitalized at Y.150,000, to build a branch line of eight miles from Saruta to Hiratori, on the Saryu river. This was licensed to begin business during June. Later on, this line is to be extended 19 miles to tap a large limestone and coal deposit in the interior. It is also reported that the Nissho railway which will connect Saruta and Urakawa of Hitaka province, where there is a branch office of the Hokkaido government, plans to make the Tomakomai Light Railway Company the basis of its line. The Nissho railway, recently licensed, will have 50 miles of line and construction work will be begun in the very near future. When this new railway is completed the Tomakomai railway should be swamped with freights which will be sent from the virgin soil of Hitaka province.

Hokkaido Mining & Railway Company, Limited

A new railway enterprise called the Hokkaido Mining and Railway Co., was licensed in July, 1918, to build a railway from Numanohata to Kanayama, and from Sapporo to Numanohata, with several branch lines, totaling in all 131 miles of new railway. The plan is to build lines which connect with the government railway main lines, especially the line to Muroran, and to extend branches into the great coal fields along the main lines. The authorized capital of this company is Y.10,000,000, of which one-fourth will be paid up by August this year.

Construction was begun in May 1920, despite the adverse conditions of the financial and industrial world, and a part of the projected line as completed and opened to business on July 24.

The section between the terminal at Numanohata and Ikubetsu, a distance of 22 miles was opened on July 24. Between these two places there are only two stations Kami Mukawa, and Kami Azuma. The steepest grade is $\frac{1}{80}$, and the gauge is the same as the government lines, 3-ft. 6-in. A sixty-pound rail is used, and will be used on all the lines, except in the places where traffic will be heaviest when a 75-lb. rail will be used.

During 1922 a section between Ikubetsu and Hetonai, some 20 miles, will also be opened. During 1922, therefore, more than 42 miles will be completed, at a cost of Y.3,000,000, it is estimated.

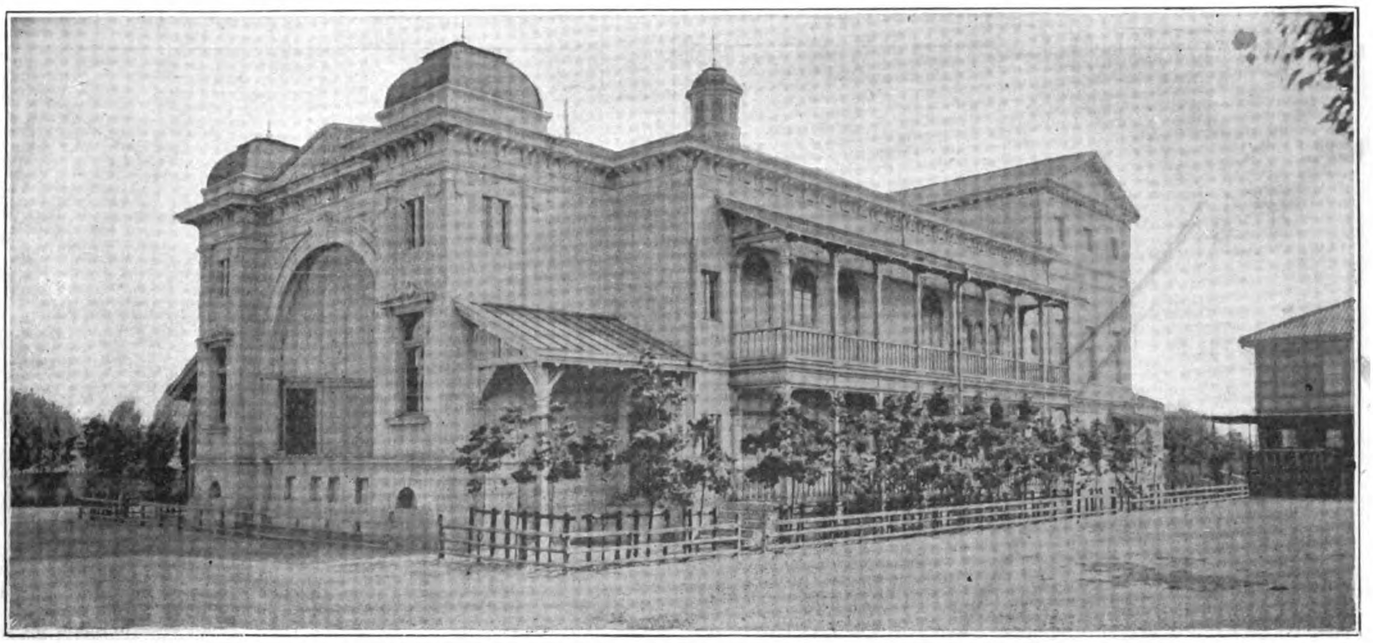
As soon as this section to Hetonai is completed work on the Numanohata-Kanayama line will be abandoned for the time and the Sapporo-Numanohata line will be begun at once. Between Numanohata and Sapporo the line will be 36 miles, and the branch line between Chitose and Oiwake will be ten miles long. The line is most anxiously awaited by the inhabitants in the zone of the projected railway, and the land for the right of way has already been acquired, largely by free gift of the delighted colonists. The actual work of construction will be begun very shortly, and when the line is opened to business a distance of some 30 miles in direct travel will be saved. The government line now in operation, which reaches both Sapporo and Numanohata covers 64 miles, the Hokkaido Kogyo Tetsudo line will be only 36 miles. The projected private line will form the base of the triangle made by the government lines from Sapporo.

The construction of the line between Hetonai and Kanayama will be more difficult than that of any other part of the projected railway lines. It is now being suggested that Kanayama be abandoned as the terminal and Ochiai substituted instead. In any case this line will connect the government Kushiro-Hakodate line with the government Muroran main line. The estimated distance of the future extension is forty miles, besides the branch line from Hobetsu to Naka Hobetsu, some five miles. The Naka Hobetsu district is near the Yubari coal field and there are enormous resources of coal and iron ore there for the tapping.

This railway company was planned to exploit the virgin mines of coal and iron along the railway zone. In the district covered by this company's lines the River Mukawa, one of the six large rivers of the Hokkaido flows. There are many forests along this river, as yet untouched with the axe, and there are agricultural villages which have no communication with the outside world. The village folk all along the different lines are most enthusiastic about the lines, and are giving all the help in their power to make the project a success.

The future of this railway company seems very promising. It has attracted a great deal of attention by touching several very rich undeveloped districts of the Hokkaido, and deserves well of the public for its plans.

The Hokkaido government allows a subsidy of 8 per cent. to this company.



Recreation Hall for the Mill Workers Employed by the Kanegafuchi Spinning Company, Ltd.

Ideal Industrialism in Japan

By Laurence Impey

IT has so happened that I have often found myself unsympathetic towards certain of the tendencies of modern Japanese life, which have appeared to me to be far too largely colored by the influence of the comparatively small political and militaristic cabal.

As, therefore, I am convinced of the innate kindness of the Japanese people as a whole, it is with the more pleasure that I put on record the favorable impressions I received during my visit to the factories of Messrs. Kanegafuchi, Ltd., which I would like the reader to appreciate with me, more particularly if he or she be interested in the economic conditions of the present day and the amelioration thereof.

I was greeted on my arrival by Mr. Tawada, the manager, to whose courtesy I am indebted for the information embodied herein, and who spent three hours in showing me one of the model factories of Japan, one indeed which rivals, in my opinion, any of the factories of the world.

My first visit was to the dining rooms, where the employees were having their midday meal, the time being eleven o'clock, when the whole factory halts for forty minutes' rest.

This may seem a short period to those accustomed to western trade unionism, but the eight or ten-hour day seems to be satisfactory to the Japanese worker up to the present, and I cannot say that I observed any signs of overstrain in the four thousand hands amongst whom I went.

The food in the dining rooms is prepared in the Company's kitchens, which I can certify are spotlessly clean, and as far as a few months acquaintance with Japanese food had made me any judge I should say it was of excellent quality, as it certainly was in quantity.

The cost to the employees amounts to ten cents per day for females and fifteen cents for men, which is well under cost, so much so that the Company last year had to meet a deficit of over £100,000, a figure which sounds surprising, but which the manager assured me was well worth while in its resultant increased efficiency and well-being of the work people.

We passed directly from the dining rooms into the general store, where the employees can purchase various articles of food, dry goods, and household necessities at cost price, a service which is certainly fully appreciated by the workpeople, for the counters were thronged with would-be buyers as we passed through.

The whistle blew, and all the workpeople streamed out, four thousand strong, some going on duty, some going off, and following in the wake of the latter we came to the dormitories.

These are provided for both male and female workers, long light airy rooms, with bedding both on the European and Japanese style, and attached to them is a room where relatives of the workers can stay during a short periodical visit free of charge.

The married employees have houses provided for them, at a rental which is about one-third the current local price, and if there are insufficient houses available it is the practice of the firm to make an allowance towards the rent of some suitable house in the vicinity.

The rents received from the Company's houses are set aside to form a repair and building fund, instead of being turned in to the usual profits and loss account, and as a result of this improvements and additions are being made all the time to the living area.

We went next across the compound to the hospital, a compact building, very clean and with a well-equipped surgery and operating room, and wards for the operatives of both sexes.

Skilled practitioners in the various branches of medicine are always in readiness, and health amongst the employees is encouraged by inspections of the works from time to time.

Any case of illness or injury while on duty is at once passed to the hospital, where the patient is maintained at the Company's expense during his or her illness, full wages being paid, from which is deducted a small charge for medical attention.

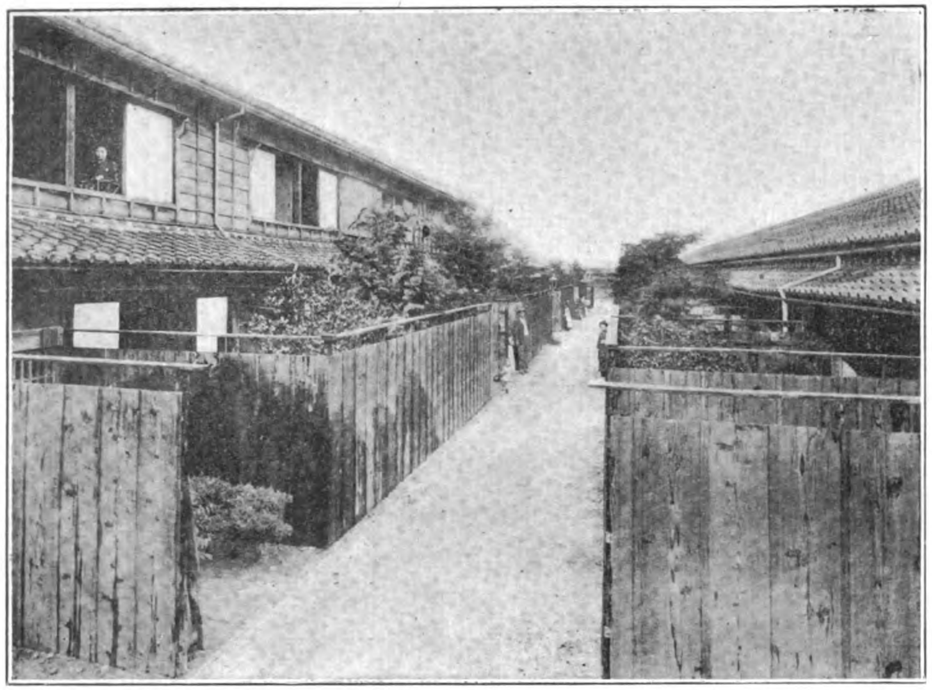
In the case of extended illness or incapacitation from work the matter is considered by a Relief Committee, composed of the heads of departments and various representatives of the employees.

A report or recommendation is made, and forwarded to the managing director for his approval, when the sufferer will receive a pension estimated on liberal terms based on the years of service.

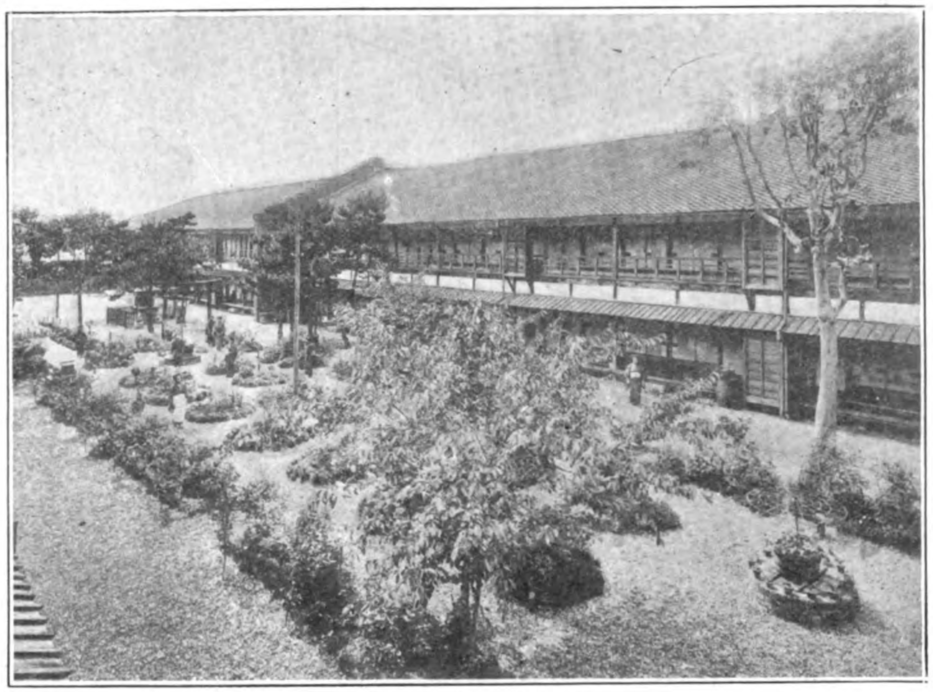
In connection with the question of sickness the Company has given especial care to the subject of tuberculosis, and immediate examination and treatment is given to suspect cases, while two sanatoria have been established at the sea to which the employees can be sent on the recommendation of the staff doctor.

IDEAL INDUSTRIALISM IN JAPAN

How the Kanegafuchi Spinning Company Watches over the Welfare of its Workers

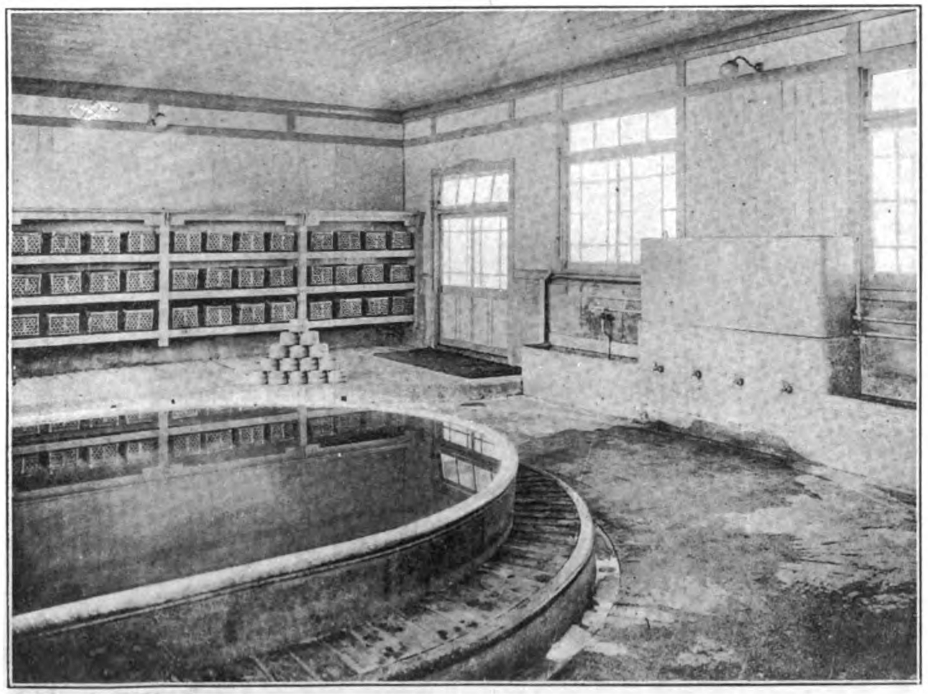


Workmen's Cottages



Women's Dormitory

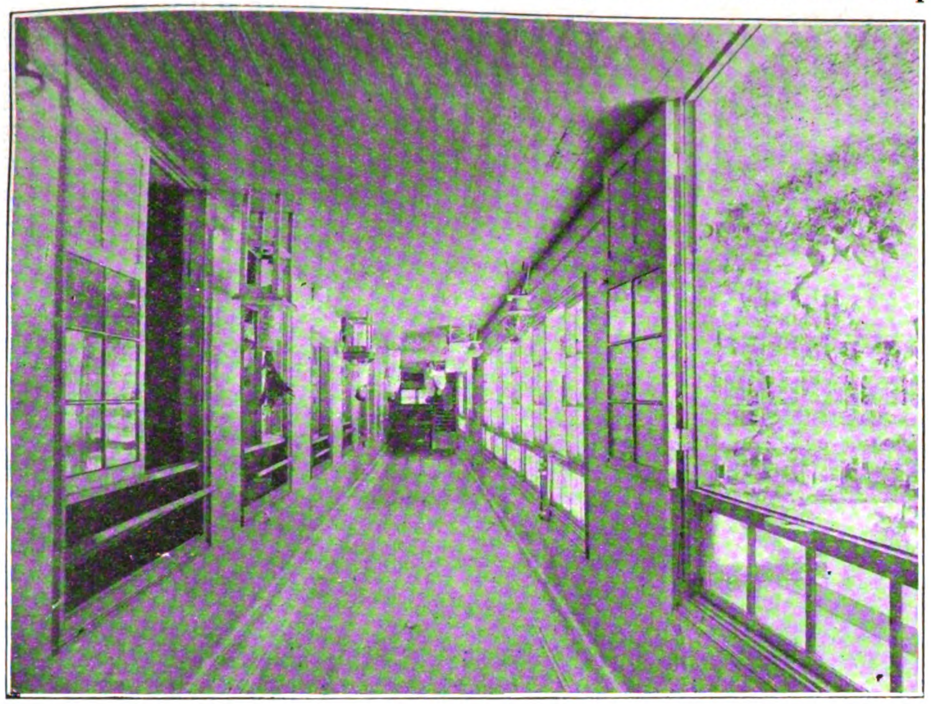
Dining Hall



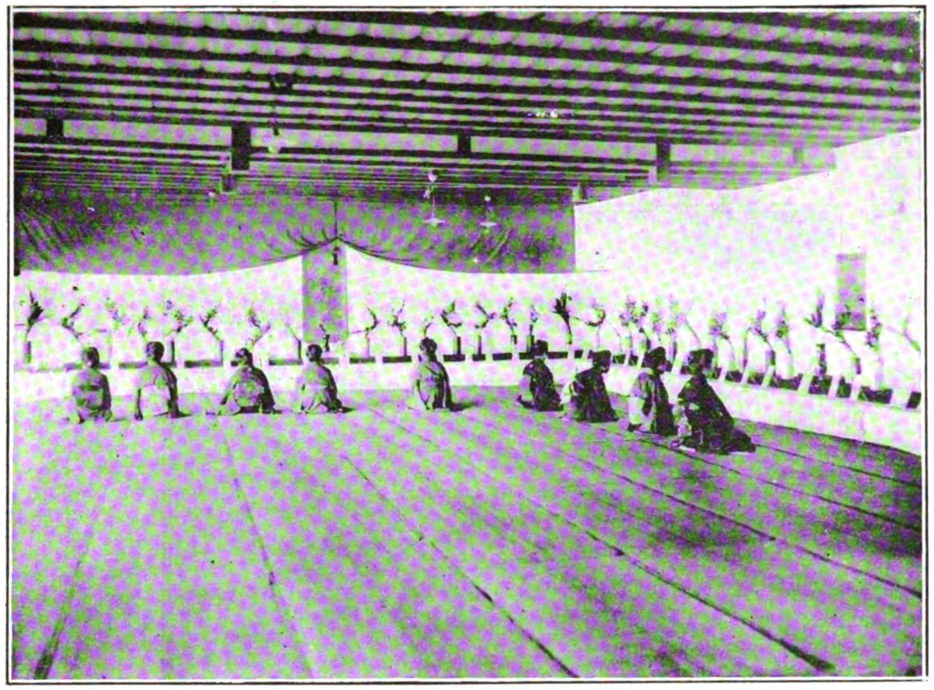
Bath Room

IDEAL INDUSTRIALISM IN JAPAN

The Kanegafuchi Idea of the Proper Relation Between Capital and Labor



The Hospital



Display of Flower Arrangement by the Female Operatives, in the Main Hall of the Dormitory

The Kindergarten

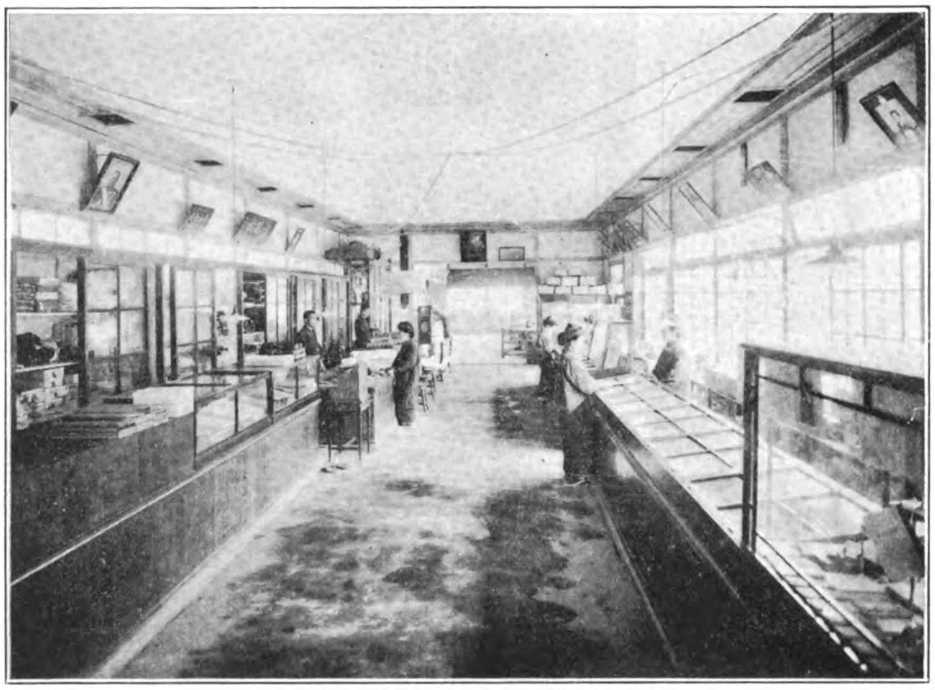
The Play-Ground

Health is encouraged in every way possible, for the bath rooms provided on the works are models of their kind, and I can vouch for it that they are used to the limit of their capacity.

The operatives change their dresses on going to work, and the soiled ones are taken to the works laundry and washed immediately, a measure of a value which can hardly be estimated.

Of course the Company is assisted in this by the fact that there is no nation on earth that is so addicted to hot baths as the Japanese, and also that the climate is sufficiently temperate to obviate the ill-effects that would probably follow snch exposure in Europe or America.

After going into the question of pensions and sick benefits with Mr. Tawada in more detail than I feel at liberty to do here, we turned to the question of education.



The Retail Company Store

First I was shown the Creche, where the young children of the employees can be left during the day in the charge of skilled nurses while their parents are at work or asleep after being on night shift.

Next, we went a few yards further on to the kindergarten, the next stage in the development of the young idea.

A dozen or more children were engaged in cutting out paper figures or in weaving bamboo work, but though they were bursting with curiosity they rose and greeted me very gravely as befitted a visitor, though it was evident that my companion was such a familiar figure that only my presence restrained them from some more intimate demonstrations.

After the children of employees have passed through their primary and secondary school education it is possible for them to advance further in their studies by means of the educational fund which the Company has founded.

Direct grants may be made from this, or alternatively, sufficient funds may be loaned the student or his parents to carry him through college or the university, subject to gradual repayment without interest in a period of ten years from the date of obtaining a position.

This, I estimate, is one of the most useful of regulations from the point of view of both employer and employee, for there is no one subject nearer to the heart of the parent in most cases than the advancement of their children, and that this is so is amply proved by the number who have taken advantage of the possibility in the last few years, and are now holding positions in the employ of the Company in their turn.

One point came to my notice which will be of interest to some, the question of employees on military service.

The practice of the Company is to pay seventy per cent. of the wages to the dependants during the soldiers' absence, and reinstate him with an average increase of pay or other promotion on his return.

This compares very favorably with the practice of business houses in any other country of which I have cognisance, and must go far towards ameliorating the hardships of conscription.

With regard to other minor items in the Company's program, I would just mention the establishment of tennis courts, baseball ground, etc., on the athletic side, two periodicals on the educational side, and the founding of a savings society to protect the pay of employees, which society, I would mention, pays the rate of 10 per cent., which is satisfactory enough considering the security of the money.

These points which I have enumerated above are only a few of those which struck me, and I could write at length about the cinema theatre, the stage and its dramatic society formed amongst the workers, and countless other items of interest, but enough has been said to indicate the lines on which the works are run, and for the results I can do no better than quote you the words of Mr. Tawada as I was leaving.

" There are on strikes," he said, and in that you have the matter in a nutshell.

The products of the mills, both from American and Egyptian cottons, are used chiefly in Japan ; in fact it may be said to be a case of Japan for the Japanese, and if only the other industries in the country will follow the lead thus given them it may be possible for them to escape the industrial unrest and disintegration which is almost universal.

Chinese Chemists Organize

The American chemical society may be the parent of the future "Chinese Chemical Society," according to information from Dr. Robert E. Swain, of the department of chemistry, Stanford University, California.

At a meeting of Chinese students, majoring in chemistry in the University of California and Stanford University, held at Stanford University some time ago, steps were taken to bring together into one organization all of the hundred or more Chinese students engaged in work in chemistry and chemical engineering in the universities of the United States, Dr. Swain reports.

The purpose of the organization, as stated in the constitution which was adopted, is to bring all Chinese engaged in work in chemistry in America into more intimate relationship professionally and socially ; to encourage a wider interest in the study of chemistry by the Chinese students at home and abroad, and to promote a higher appreciation of the place of chemistry in the growth of the Chinese nation and the advancement of its people.

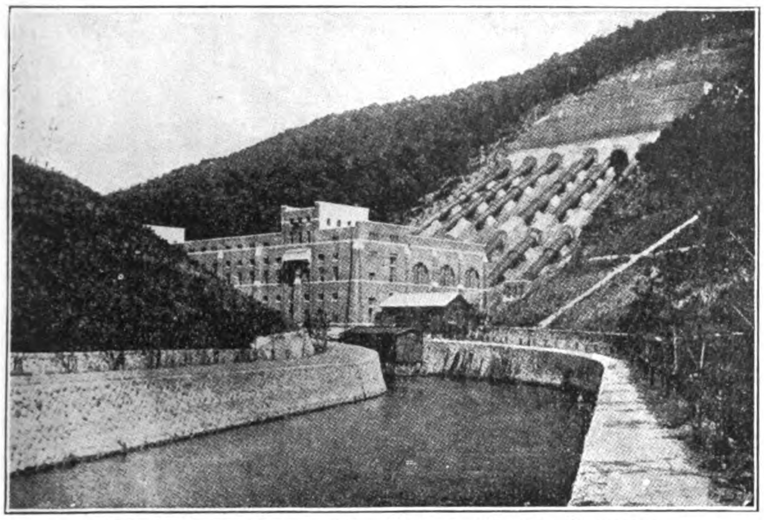
The organization is to be called " The Chinese Students' Chemical Association," and already has thirty or more members in western universities. It is expected that before the beginning of the next academic year, the membership will be extended to all of the universities of the United States.

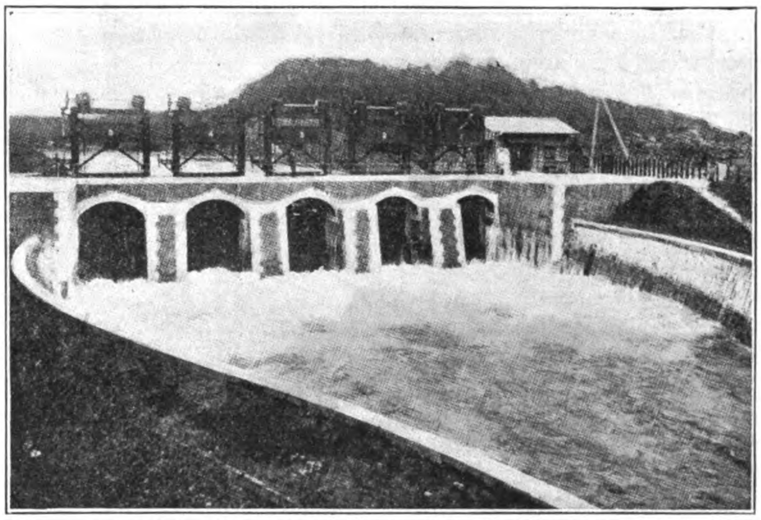
Electrical Developments in Japan

THE UJIGAWA COMBINE

IN September 1921, the Ujigawa Denki Kabushiki Kaisha (Uji River Electric Co., Ltd.), absorbed the Omi Suiryoku Denki K.K. (Omi Hydro-Electric Power Co., Ltd.), and in October, the Yamato Denki K.K. (Yamato Electric Co., Ltd.) At the same time the Ujigawa was actively engaged in building its No. 2 plant, and drawing up plans for a No. 4 plant, and a great steam generating station. Both the Omi and Yamato companies have large construction schemes underway, which, when completed, will make the Ujigawa organization one of the largest in Japan.

The original Ujigawa Denki K.K. was established in 1906, and its first hydro-electric power plant at Uji city on the Uji river was completed in July 1913. The head office of the company is at 98 Kami Nichome, Sonezaki, Kita Ku, Osaka City. During the war when the profits of all electric power companies were very great the Uji and the Inawashiro Hydro-electric Companies, were the only power enterprises in Japan which failed to pay 12 per cent. dividends. The profits of the Inawashiro were maintained at a low level because of the high cost of constructing its new power stations and main transmission lines to Tokyo; added to the fact that all its power was sold to the Tokyo Dento K.K. on a long-term contract at a very low rate.


No. 1 Power House of the Ujigawa Electric Company


Sluice Gates of the Ujigawa Electric Company

During the first two years of the war, the Ujigawa generated only 23,350 kilowatts; from 1916, this was increased to 29,000, by increasing the head of water at its principal generating station. The Osaka Dento K.K. bought 2,500 kilowatts in the daytime, and 32,-kilowatts at night. Four thousand kilowatts were supplied to the Kyoto Dento K.K., and the Osaka city electric bureau bought 2,000 kilowatts. Besides these large consumers, the government arsenal, mint, and several big industrial concerns bought a considerable amount of power. The 29,000 kilowatts generated from its own power plants was not enough to meet all demands so the company bought 10,000 kilowatts from the Osaka Dento K.K., which was supplied from that company's steam power plant in Osaka city.

The Ujigawa Denki K.K. supplied power to the Osaka Dento at 8 *rin* (four-tenths of a cent U.S. gold) per kilowatt, and to the Osaka city electric bureau at 6 *rin* (three-tenths of a cent U.S. gold) per kilowatt. But it bought power from the Osaka Dento on a sliding cost scale, based on the price of coal at Y.50,000 per 10,000 *kin* (13,333 pounds). For every advance of five *yen* per coal unit, the Ujigawa was obliged to pay 1.2 *rin* (three-fiftieths of a cent U.S. gold) more per kilowatt. During the war the price of coal rose without ceasing, and the Osaka Dento's charge for power supplied the Ujigawa rose too. Unfortunately the company's selling contracts were not on a sliding scale of charges and consequently it was unable to show such splendid profits as other companies supplying power in the great industrial centres. It did manage to raise its own charge to the Osaka Dento to 1.4 *sen* (seven-tenths of a cent U.S. gold) in July, 1918, but coal still continued to rise, and even up to the present time, the Ujigawa Dekni is much handicapped by the high price of coal, and the consequent high cost of the power purchased from the Osaka Dento.

This serious handicap made the directors turn their attention to increasing the company's supply of water power. It was decided to construct the No 2 hydro-electric plant, and a large coal-burning station at Fukazaki, Nishi Ku, in the suburbs of Osaka.

Before building the No. 2 power plant, it was necessary to enter into an understanding with the villages along the Uji River. This required long-drawn-out negotiations and permission was not easily obtained. Construction is now being rushed on the Fukazaki coal-burning power plant, which occupies 875 *tsubo* (31,500 sq. ft.). The effective generating capacity of this station will be 20,000 kilowatts, with 10,000 kilowatts reserve power for emergencies, a total of 30,000 kilowatts. In May 1920, five thousand kilowatts of plant were installed and the balance will be in operation by the end of 1922.

Osaka lies in the midst of a great plain, and water power must be obtained from distant sources. In the beginning of the hydro-electric industry in Japan it was difficult to transmit power over long distances, but to-day conditions have been so advanced and power equipment so greatly improved that distance no longer deters such enterprise. The Daido Denryoku K.K. and the Nihon Denryoku K.K., have built power houses in Shinano, Etchigo and Hida provinces in central Japan, a hundred miles and more from Osaka. The Nihon Denryoku will supply this year 20,000 kilowatts from its distant power houses to Osaka; next year, 45,000 kilowatts, and in two or three years it will generate 100,000 kilowatts for transmission to the industrial centre of the country.

The largest supplier of hydro-electric power to Osaka to-day is the Ujigawa Denki K.K. When the above-mentioned two new companies enter the field in competition, the power situation in Osaka will be greatly complicated.

Despite the relation of buyer and seller existing between the Ujigawa and the Osaka Dento they are bitter rivals for supremacy in Osaka, and as the Daido Denryoku is operating in connection with the Osaka Dento, the Uji company has another formidable competitor to face.

It behooved the Ujigawa not to stand idle and await this threatened competition, and in order to prepare for the future the amalgamations with the Omi Suiryoku and the Yamato Denki were carried out.

The Omi Suiryoku possesses a license for the exclusive supply of light and power in 130 towns and villages in North Omi province. Its boundaries embrace the towns of Hikone, Yawata, Nagahama and Minakuchi, where industry is making great strides. There is a great demand for power in Omi, but little supply at present.

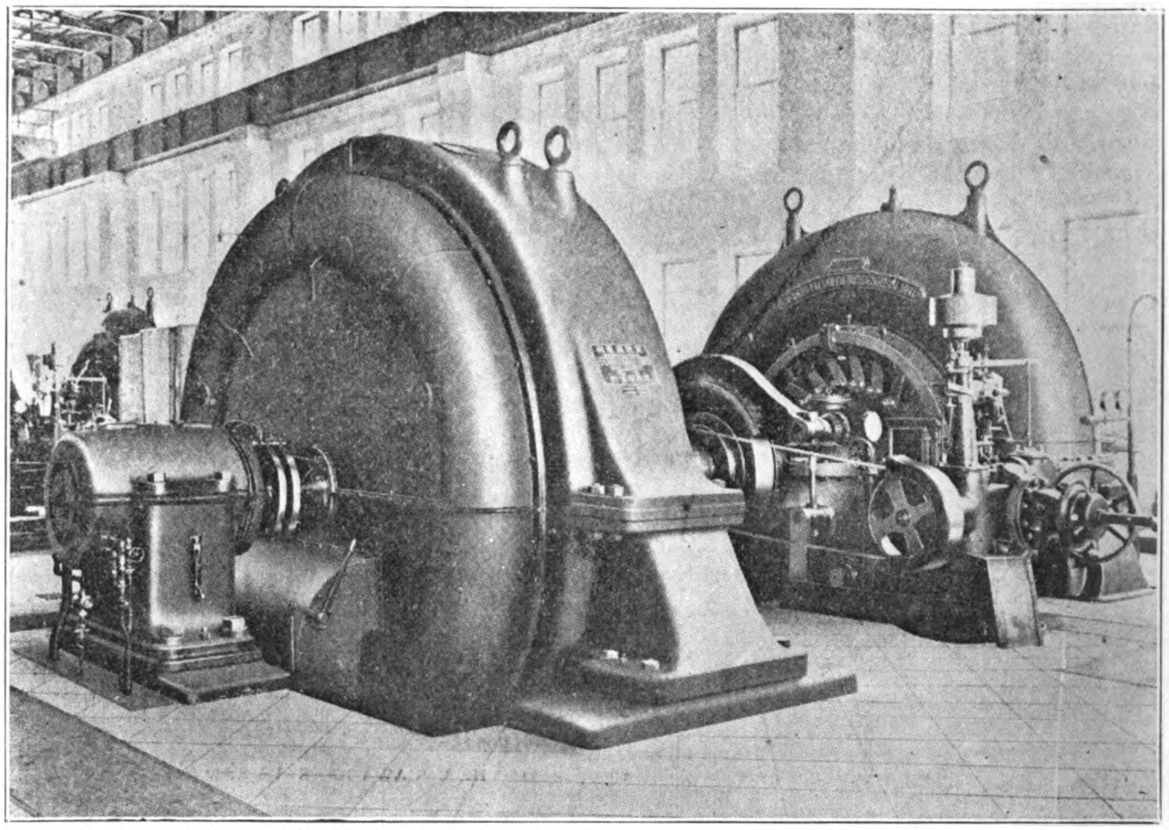
The Yamato Denki is licensed to supply light and power in certain districts in Nara prefecture. Oji, Gojo, Kamiichi, and Shimoichi lie within its boundaries. So far, this company has shown very poor results, and the reason for the merger with the Ujigawa is easily understood. The districts between Nara and Wakayama in which the Yamato Denki operates, are watered by two rivers, the Totsuka river and the Kumano river, which have great potential power in their upper reaches.

The Ujigawa and the Nihon Denryoku are related companies and will not compete, but the Daido Denryoku will be a serious competitor. According to inspired statements the Daido will supply power in Osaka at 3 *rin* per kilowatt less than the Ujigawa. The Daido holds a license to supply power in Osaka, but it has not yet succeeded in obtaining a license to supply light, but because of its relations with the Osaka Dento this class of business will perhaps not be attempted in Osaka city. However, because of the uncertain market for power, which varies in consumption according to economic conditions, all electric power companies are eagerly seeking licenses to supply light, for which the demand has never decreased, but continually grows greater and greater. The large power concerns are all trying to obtain control of small local lighting companies, and the Kansai Denki already mentioned, has annexed ten and more companies with this end in view. The Daido and the Kansai are both financed by the same capitalists, and hopes are expressed of an eventual merger. Such an amalgamation would be very advantageous to the Kansai as the Daido owns many very valuable power sites and licenses.

The Daido, and the Kansai are both operating in the vicinity of Nara, and if they should obtain power sites on the Totsuka and Kumano river, it would place the Ujigawa on a very disadvantageous position with powerful competitors on all sides of it. The Yamato Denki business has still to show good results, but it owns valuable power rights on these two rivers, and is potentially very powerful. From the Yamato power sites to Osaka is 50 miles, while from the Daido's Yomikaki power plant on the Kiso river to Osaka city it is 144 miles. The Yamato's lines need be only one-third this length. This was the reason behind the purchase of this concern by the Ujigawa Denki K.K.

The No. 1 power plant of the Ujigawa and the Fukuzaki power plant are exclusively for generating power for industrial motive uses. Since the merger with the Omi and the Yamato companies, the Ujigawa has commenced the supply of power for lighting. The present business of the company is listed below :—

No. 1 power plant generates..	29,000	kilowatts
Fukuzaki plant ,, ...	20,000	,,
Omi Suiryoku owns four power plants generating	2,132	,,
Yamato Denki generates	1,050	,,
Water power	32,182	,,
Coal	20,000	,,
Total	52,182	,,



The No. 1 Power House of the Ujigawa Electric Company, equipped with Six Water Driven Alternators, 7,000 k.v.a., 12,000 volts, 360 r.p.m., 60 cycles, made by the Shibaura Engineering Works of Tokyo

Omi Suiryoku supplies	144,029	lights
Yamato Denki ,, ...	39,000	,,
Total	183,029	,,

The capital of the Ujigawa was originally Y.12,500,000, but this was increased to Y.25,000,000 in 1916. The capital of the Omi Suiryoku was Y.4,000,000, but it was purchased for Y.6,500,000, and on making the merger the capital of the Ujigawa was increased to Y.31,500,000.

The Yamato Denki was capitalized at Y.5,000,000, of which Y.2,060,000 was paid up. It was purchased at a valuation of Y.6,250,000, and the capital of the Ujigawa was expanded to Y.37,650,000 when the merger was made. Of this amount, Y.34,650,000 was paid up. The balance of Y.3,000,000 was paid in two instalments of Y.1,500,000 each in March and May of this year, making the present capital all paid up.

The total cost of equipment and construction of the Ujigawa Denki K.K. merger, to the end of May 1922, amounted to

Y.52,543,821. Debentures of Y.16,500,000 have been issued to meet the excess construction costs.

No. 1 water power plant	Y15,917,012
Fukuzaki steam plant	5,952,158
Osaka transformer station and equipment ..	13,633,561
Omi Suiden power equipment	2,029,333
Omi Suiden electric light equipment	3,240,025
Yamato Denki power equipment	976,837
Yamato Denki light equipment	735,967
No. 2 power house, estimated costs to date ..	4,166,366
Omi Suiden plans for expansion	1,661,948
Yamato Denki plans for expansion	4,430,614
	Y52,543,821

The No. 1 power plant transmits its power to a transformer station at Noe. The total cost per effective kilowatt generated, estimated at 26,500 kilowatts, was only Y.600.00 for the power plant alone. Including the Noe transformer station and all transmission line costs, this rises to Y.1,115 per kilowatt, which is not particularly expensive for this construction in Japan.

The costs of construction per kilowatt of effective power of the Omi Suiden was Y.95.00, and of the Yamato Denki Y.93.00. These are very low costs, but the equipment is on a very small scale, and construction was completed before prices rose, so they were built very inexpensively.

Averaging the costs of all the hydro-electric power generated by the present Ujigawa organization they amount to Y.514 per kilowatt. The amalgamations have therefor materially reduced the construction costs per kilowatt.

The Omi and Yamato supply 183,000 lights. The equipment for these lights cost Y.3,970,000, making the cost per light supplied Y.21.73. In places where population is large, this is not too high ; in Osaka city the average cost is Y.13.00 per light, but in North Omi, and in the Yamato Denki's boundaries, where dwellings are scattered over a great deal of territory, the average equipment cost per light is Y.21.00. The Fukuzaki power plant has cost Y.287.00 per effective kilowatt. Machinery is cheaper to-day than at the time the plant was ordered, but taken all in all this cost is not too great.

The Ujigawa Denki K.K. has many plans for increasing its power supplies. They include adding 42,250 kilowatts to its effective water power, and 30,000 kilowatts to the coal-burning plants efficiency. Two plants will be built to operate in the territory of the Yamato Denki, at Shirakawa and Suriko, to generate 8,000 kilowatts. In the boundaries of the Omi Suiryoku a plant to generate 2,250 kilowatts will be built at Kawada. The total estimated costs of construction for all these projects reaches Y.38,200,000.

The principal project under way now is the construction of the No. 2 power plant.

The No. 2 and the No. 4 power plants will utilize the stream of the Uji River. No. 2 is being built on the upper stream of the river about four miles up-stream from Ujibashi at Tawara Mura, Suzuki Gun, in Kyoto prefecture. A dam will be built to the opposite bank of the river, at Makishima Mura, Kuse Gun, and from the dam a canal 6,400 feet long will be constructed to the power house. The fall will be 150 feet, and the effective head of water 2,800 cu. ft. per minute.

The No. 1 power house generating 291,000 kilowatts receives an effective head of 2,800 cu. ft. from Ishiyama near Lake Biwa, by means of a canal beginning at Nango, which has a fall of 205 feet to Uji city.

Between Nango and Uji city, the Uji river makes two great turns, one at Ishiyama, and the other at Makishima. This last is a very great bend which the No. 2 power plant will utilize.

The No. 4 power plant will utilize only the excess of water from the No. 2 plant at Makishima. At No. 1 plant the Uji river gives 2,800 cu. ft. of water, at No. 2 the same amount, but during the season when the water is low, the head of water will be not at more than 2,000 cu. ft. The No. 2 and No. 4 plants will divide this 2,000 cu. ft., and 70-foot fall will be effective for the generator the No. 4 plant. However, it will not be able to operate at all times when the water is low. Its maximum efficiency is estimated at six months a year.

The No. 2 plant will generate 26,000 kilowatts, and No. 4, 9,000 kilowatts. At No. 2 one cu. ft. of of water will produce 9.3 kilowatts, at No. 4 it will produce only 4.5 kilowatts. No. 2 power plant is down stream from No. 1, and it will use the water of the main stream of the Ujigawa. The Uji river has a large volume of water, but its fall is slight. In this respect the Ujigawa Denki's source of power is like that of the Inawashiro Suiden. At No. 1 the fall is 1 in 180, but at the Inwasahiro No. 1 power plant the fall is 1 in 20. At No. 2 plant of the Ujigawa the fall is 1 in 34, and the ground and subsoil are very hard, and because of this the cost of construction will probably be high. The district, however, is most convenient for transmitting power to Kyoto and Osaka, and accordingly there will be little expense for transmission lines, etc. One kilowatt of effective power will probably cost from Y.630 to Y.640.

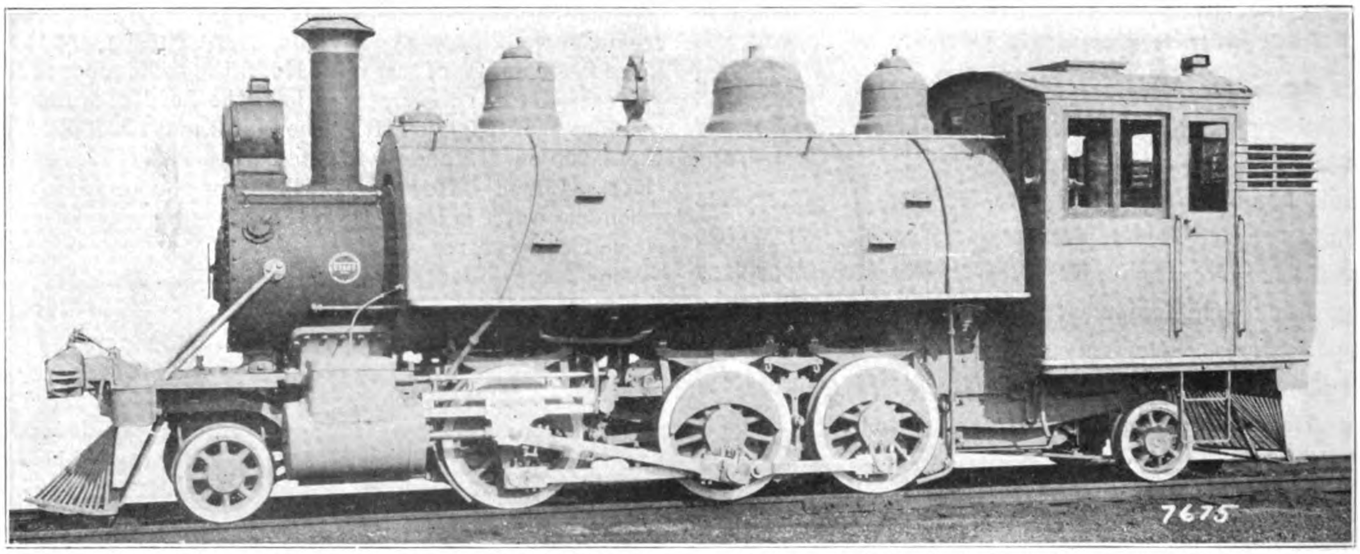
The great advantage the Ujigawa Denki over all competitors lies in its nearness to the consuming centres. Its power lines are gradually being improved and transmission losses have been cut to a minimum. From the Uji No. 1 power plant to Kyoto is only 8 miles, to Osaka 21 miles. The Inawashiro Suiden is 140 miles from Tokyo. The Daido Denryoku and the Nihon Denryoku are respectively 144 miles and 189 miles from Osaka. Consequently the profits of the Ujigawa compared to those of the other companies should be proportionately greater. No. 2 power house in comparison with No. 1 with its fall of 1 in 180 will have many advantages.

The Fukuzaki coal power plant might seem superfluous with these great potentialities from the Uji river. But it is extremely necessary to maintain a steady supply of power sufficient to cover all demands. Water power is insufficient and No. 4 station will be out of operation more than six months of the year. This is why the Fukuzaki station is being augmented by 10,000 kilowatts. Even this is insufficient because of competition with the Osaka-Kyoto Electric Railway, so a No. 3 coal-burning power plant to generate 10,000 kilowatts is now being planned.

No. 2 and No. 4 power plants will be completed in 1923. The Shirakawa power plant will be partly completed and in operation by October this year, and the Suriko plant will be completed in April, 1923. The Kawada plant was completed in April this year. Two coal-burning plants in Osaka and Kyoto will also be completed this year.

The No. 3 power plant to generate 10,000 kilowatts is now being worked out by the engineering staff. Another plan embraces the construction of a hydro-electric power house on one of the sites of the Yamato Denki, to generate 4,000 kilowatts. Costs of construction of all these plants and the necessary transmission equipment are estimated to be Y.44,700,000. In future, the light and power equipment of the Omi and Yamato companies will require expansion, and this will make more demands upon the company's funds. Besides the Ujigawa Denki will shortly be called upon to pay up a part of its share of the business of the Nihon Denryoku already mentioned as preparing to supply 100,000 kilowatts in Osaka within the next three or four years, in which the Ujigawa is one of the principal shreholders. A part of the outstanding debentures must also be redeemed shortly, and the Ujigawa Denki K.K., as it is now constituted, and with the plans for construction it has in hand, stands in need of about Y.60,000,000 to complete its plans.

It is generally believed in the money market that the Ujigawa Denki K.K. will double its present capitalization before the end of 1922. But even this will not provide all the money needed for construction. The balance will be raised by debentures.



"Prairie" Type Switching Locomotive for the Peking-Suiyuan Railway, built by the Baldwin Locomotive Works

Switching Locomotive for China

THE Peking-Suiyuan Railway which taps China's great northwest has now about 400 miles of standard gauge (4-ft. 8½-in.) track open and is one of China's most important railways, from both political and industrial standpoints. The line was constructed entirely with Chinese capital and by Chinese engineers, having been originally conceived by Dr. Chan Tien-yu, better known to foreigners as Jeme Tien-yu.

Construction was started in 1905 under Dr. Chan, on the Peking-Kalgan section. In 1909 public service was begun. This section of line, about 122 miles long, is without doubt the most remarkable piece of railway engineering yet carried out in China. The tunnel under Nankow pass is the longest yet bored in China, its setting being extremely picturesque, and is yearly visited by thousands of tourists.

In succeeding years, construction of the line from Kalgan to Suiyuan proceeded and on May 1, 1921, the railroad was opened as far as Suiyuan, the first train being hauled by one of the Baldwin locomotives herein described, of which 17 are now owned by the Railway, four having been purchased in 1910, three in 1919 and ten in 1920.

Locomotives of this type are peculiarly adapted for switching, general utility and construction service, being a self-contained unit and having a short rigid wheel-base which, combined with the guiding and supporting features of front and rear trucks, makes the locomotive safe to operate in either direction on light rails and over short radius curves.

The photograph herewith shows one of the ten locomotives which were ordered in May, 1920, with a request for early shipment. In October of the same year the engines were on their way to China.

These locomotives are designed for ruling grades of one per cent. and have a straight top boiler and a steel firebox. The piston valves are actuated by Stephenson valve motion and controlled by a screw reverse gear. The brakes are of the Baldwin steam type schedule U. 6. In common with the practice on Chinese Government Railways, M. C. B. automatic couplers are employed. Other special equipment includes Coale safety valves, Ashcroft steam gauges, Baldwin water gauges, Monitor injectors, oil headlights and Nathan double bulls-eye lubricators.

Gauge	4′ 8½″
Cylinders	16″ × 24″
Valves	Balanced

BOILER

Type	Straight top
Diameter	50″
Thickness of barrel sheets	½″ 9/16″
Working pressure	180-lbs.
Fuel	Soft coal

FIREBOX

Material	Steel
Staying	Radial
Length	60 7/16″
Width	34⅜″
Depth, front	57⅛″
,, back	53″
Thickness of sheets, sides	5/16″
,, ,, ,, back	3/16″
,, ,, ,, crown	⅜″
,, ,, ,, tube	½″

WATER SPACE

Front	4″
Sides	3″
Back	3″

TUBES

Diameter	2″
Material	Steel
Thickness	No. 12 W. G.
Number	152
Length	13′ 6½″

HEATING SURFACE

Firebox	90 sq. ft.
Tubes	1,071 sq. ft.
Total	1,161 sq. ft.
Grate area	14.4 sq. ft.

DRIVING WHEELS

Diameter, outside	44″
,, centre	38″
Journals, main	7″ × 8″
,, others	7″ × 8″

ENGINE TRUCK WHEELS

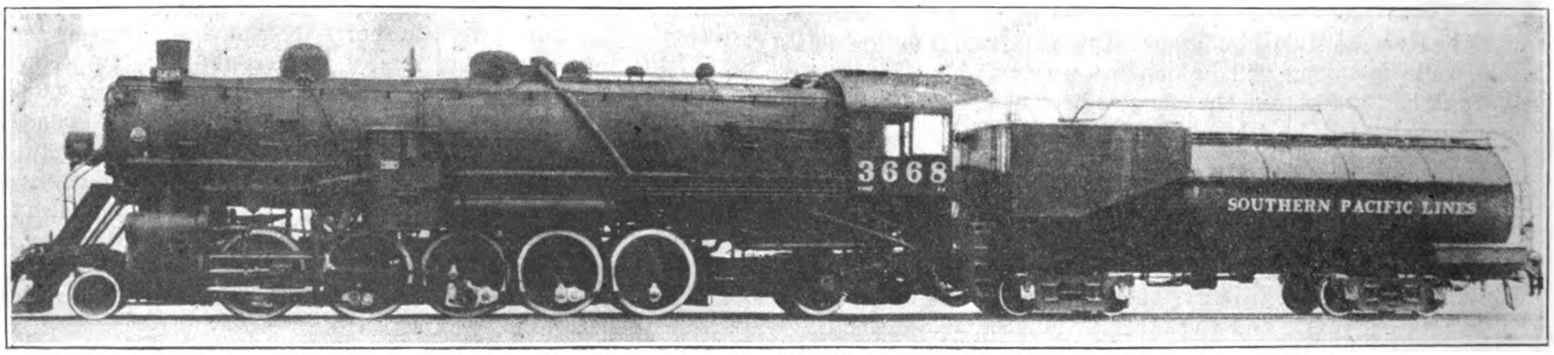
Diameter, front	28″
Journals	4¼″ × 7½″
Diameter, back	28″
Journals	4¼″ × 7½″

WHEEL BASE

Driving	10′ 0″
Rigid	10′ 0″
Total engine	25′ 9″

WEIGHT

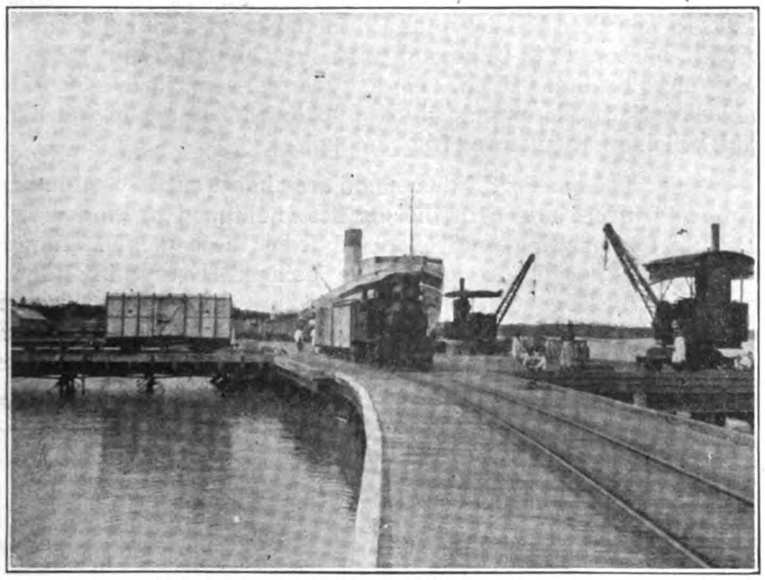
On driving wheels	87,850-lbs.
On truck, front	11,250-lbs.
,, ,, back	14,000-lbs.
Total engine	113,100-lbs.
Tank capacity	1,600 U.S. gals.
Fuel	5,000-lbs.
Service	Switching



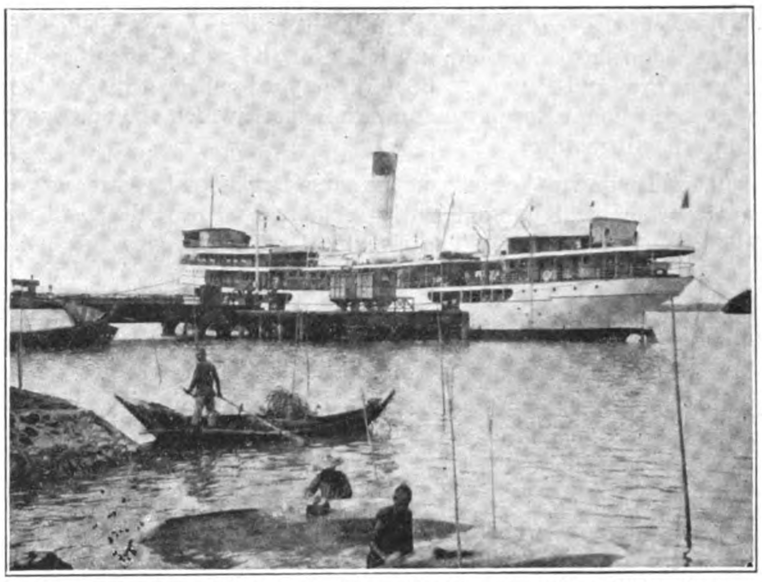
Fifty of these Santa Fe Type Locomotives Just Built by The Baldwin Locomotive Works for the Southern Pacific Lines

Building Ports in Malaya

By L. G. Blochman



The Deep-water Wharf at Port Swettenham



One of the three Wharves for Coastwise Vessels at Port Swettenham

ALTHOUGH the tin and rubber slump has temporarily caused a retrenchment of many development schemes and has forced an economy of both passenger and freight trains service on all lines, the Federated Malay States railways are going ahead with two major projects calling for an expenditure of close to $32,000,000 Straits currency.

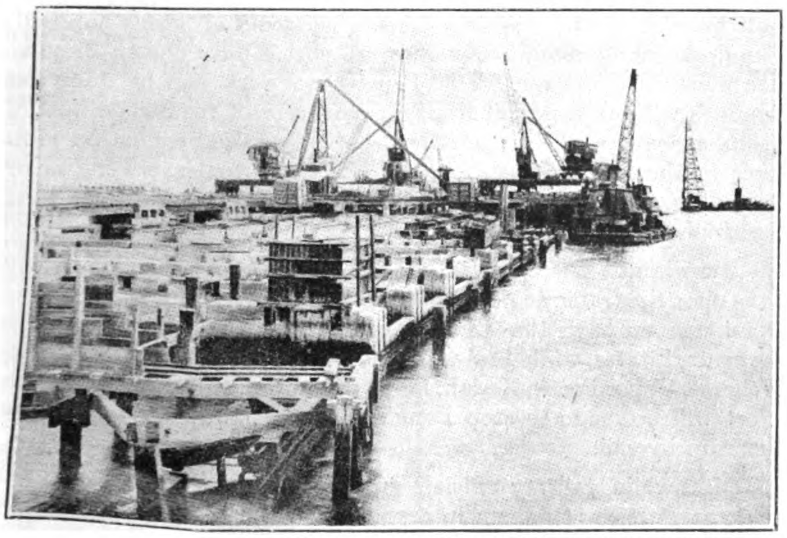
Curiously enough, neither of the projects is in the F.M.S. proper. One is the construction of a causeway bridging the straits between Johore Bahru, in the independent state of Johore, and Woodlands, on the island of Singapore, Straits Settlements. The other is known as the Prai scheme, and consists in making a deep-water port at Prai, opposite Penang on the mainland of Province Wellesley, Straits Settlements.

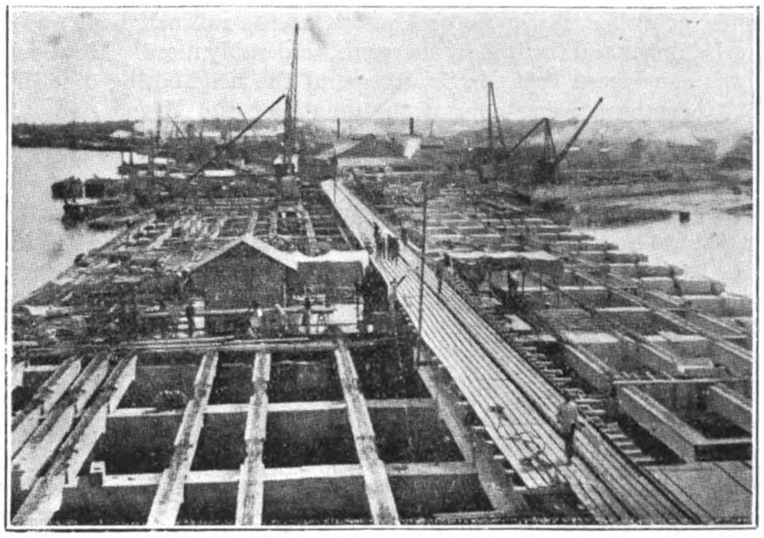
The completed Prai scheme will cost $21,450,000, it is estimated. Of this amount approximately $1,500,000 has gone into doubling the line between Prai and Butkit Mertajam, where the railway branches into two lines, one leading north to Bangkok and the other south to Ipoh, Kuala Lumpur and Singapore. The increased trackage has already been laid, and will take care of the congestion that is expected when the port area begins to feel the traffic resulting from the opening of the deep-water wharves and warehouses.

At present, both ocean-going and coastwise steamers anchor in the roads between Penang and Prai and discharge their cargo into *tongkangs* whence it is taken either to Penang or Prai for re-shipment. The P. & O. wharf at Penang is the only one in the vicinity. When the railways' scheme is completed, liners may come alongside the docks and discharge directly into railway cars, or into warehouses which are also being erected.

The channel of the Prai river is being used for a basis of construction work. The river is being dredged to a depth of 30-ft. at dead low water for a distance of a mile from its mouth. The average width of the channel will be 500 feet, with an additional width opposite the docks, allowing room for vessels to turn without difficulty.

The new deep water docks are being built on the south bank at the mouth of the river. When finished they will afford 1,100 feet of wharfage, and will contain two godowns, each 475-ft. by 65-ft. Adjoining these docks are the present coastwise docks, 600 feet long, which are being widened and fitted with a godown of dimen-





CONSTRUCTION OF NEW WHARVES AT PRAI, BY THE F.M.S. RAILWAY DEPARTMENT

sions 375 by 65-ft. With the dredging completed, this wharfage will also be available for ocean-going shipping, giving in all 1,700 feet of deep-water docks for general shipping. Directly adjoining this dock, will be a coal wharf 900 long with full bunker accommodations. Both domestic coal from the Malayan collieries in Selangor, and imported coal for those ships desiring a different grade, will be available here.

Beyond the coal wharf is the present railway yard, with engine and carriage sheds, station, and jetty for the steam-launch service between Prai and Penang. Behind the yard will be built quarters for the additional European and Asiatic staff which the opening of the port will require.

Further down the river on the same bank is a large mangrove swamp which will be sufficiently reclaimed to provide a site for drydocks and slipways. The river will be dredged to this point to give access to these ways by large ships.

On the opposite side of the new wharf from the deep-water dockage, a lagoon will be dredged to a depth of 16 feet at low water, giving a harbor space of 300 by 1,100 feet. This lagoon will be given over to ships of light draft, and four 100-foot docks will be built at the south side. Behind these docks will be eight godowns, two to a dock, measuring 400 by 65 feet.

Behind the godowns, on land that will be made available by deviating the course of a small stream, there will be set aside one-acre blocks for factory sites, or sites for any other industrial purposes which may present themselves when the port is fully developed.

On the north bank at the mouth of the river 250,000 square yards of mangrove swamp will be reclaimed. No definite use has been yet assigned to the land which will be made available for this project, known as the Bagan Luar Reclamation.

The work on the Prai scheme was begun in May, 1918, and will be completed by the end of 1924. Some of the docks will be finished before the final date, and railway officials expect to have some deep-water wharfage, completely equipped with tracks and steam cranes, open to traffic by the end of next year.

The contract for the Prai wharves is in the hands of Messrs. Topham, Jones & Railton, Ltd., of London. Construction is being supervised by Messrs. Coode, Matthews, Fitzmaurice & Wilson, London, consulting engineers for the F.M.S. Railways, who are responsible for the plans and specifications.

The completion of the Prai docks will make two ports that the railways have built on the peninsula. The enterprise of the F.M.S. government made Port Swettenham, chief port for Selangor, into a port of entry taking care of 175 ships a year from Europe and America. The development of Port Swettenham is an accomplishment which would never have been undertaken by a private railroad company. From the standpoint of business, it would be more advantageous to have goods intended for the central Malay states landed at either Singapore or Penang, as the railroad haul would thus be longer and the freight charges considerably more. However, it was considered best for Selanger and the neighboring territory that there be a going port at the mouth of the Klang river, 25 miles from Kuala Lumpur.

Until 1899, Klang town was the port for Selangor, and coastwise shipping from Singapore and Penang used to come five miles up the river to a small dock which has since disappeared. In 1899 the F.M.S. Railways extended their Kuala Lumpur-Klang branch to Port Swettenham, and wharves were built to take care of the coast shipping which was diverted from Klang. In 1913 work was begun on a series of wharves which made Port Swettenham a deep-water harbor, and in 1918 the first ocean-going ship, a Ben Line steamer, came alongside the new docks.

Three small docks take care of the coastwise shipping at Port Swettenham to-day, and 2,000 feet of deep-water wharves, standing in 32 feet of water at dead low tide, accommodate the ocean-going ships. All docks are equipped with trackage and galvanised-iron godowns, so that cargo may be either loaded directly into freight cars, or stored for future shipment.

Since facilities have been provided, imports from Europe come direct to Port Swettenham without transhipment. A service by the Blue Funnel Line brings shipments direct from the east coast of the United States, and occasional ships from Pacific ports come direct, but a good part of American cargo is still handled twice. The Blue Funnel ships are the most frequent callers at this F.M.S. harbor, P. & O. second, with the Ben Line and the Glen Line close behind. Beside the over-seas carriers, there is considerable Asiatic traffic, principally rice-boats from Rangoon and Bangkok which are regular and frequent callers.

Exports from Port Swettenham are almost entirely rubber and copra. Tin ore mined in the district is shipped to Singapore or Penang for smelting, and exported from these points. Imports range from needles to locomotive boilers. Everything that is consumed in the central Malay states comes through Port Swettenham. All the material for the F.M.S. Railways comes in here, including rolling stock. Much mining equipment is also unloaded for Selangor, Pahang and Lower Perak.

Mr. W. G. Stewart, assistant railway traffic manager in charge of Port Swettenham, is particularly proud of the harbor's facilities for handling heavy shipments. Railway regulations forbid the handling of anything weighing more than 20 tons, but no single pieces have ever come through weigh more than 15 tons. Mr. Stewart tells the story of the first American ship that called after the deep-water docks had been completed :

" She was bringing an American dredge for the Bentong Tin Mines in Pahang, " says Mr. Stewart. " The skipper was a bit worried about getting the dredge off. He wanted a fortnight to discharge, as it had taken him nearly that to load it in San Francisco with a floating crane. He was considerably surprised when we had all the dredge parts on a train headed for Bentong at the end of five days."

The port is fortunately situated in regard to coastwise shipping, as coasters bound from Singapore to Penang or *vice versâ* can put in and spend six or eight daylight hours at work without altering the time of their ultimate arrival had they been making a direct run.

Spending the day loading at Singapore, ships usually leave in the late afternoon. If they made the run continuously, they would arrive at Penang at midnight of the second day. That would have them loafing in the roads for six hours, awaiting daylight. Instead of doing this, they put in at Swettenham, which is overnight from either terminal port and only two miles off the direct course between them, and spend the extra hours loading and discharging whatever cargo they have for the central states.

Port Swettenham is a free port, charging only a pilotage fee. No wharfage is charged. Ships loading or discharging at the railway wharves are assessed 5 cents per picul on goods handled. The financial consideration makes the port a busy one on Sunday mornings. In Singapore and Penang no work can be done on Sundays without a permit from the governor of the Straits Settlements accompanied by a healthy fee. As no such regulation is in force in the F. M. S., ships make it a point to leave Penang or Singapore on a Saturday, and spend Sunday working at Port Swettenham.

Just what effect the opening of a deep-water port at Prai will have upon the traffic at Port Swettenham is a matter for speculation. Opinion seems to be that the Selangor port will retain the trade for the central states, while Prai will handle freight for Penang, Province Wellesly, Upper Perak, Kedah, Perlis, Kelantan, and Siam. A great effort will be made to stop Bangkok shipments at Prai and send them up by rail.

Meanwhile, railway officials even talk of improvements to be made at Port Swettenham in case traffic increases " when rubber and tin go up."

Conservancy Work in China

By Laurence Impey

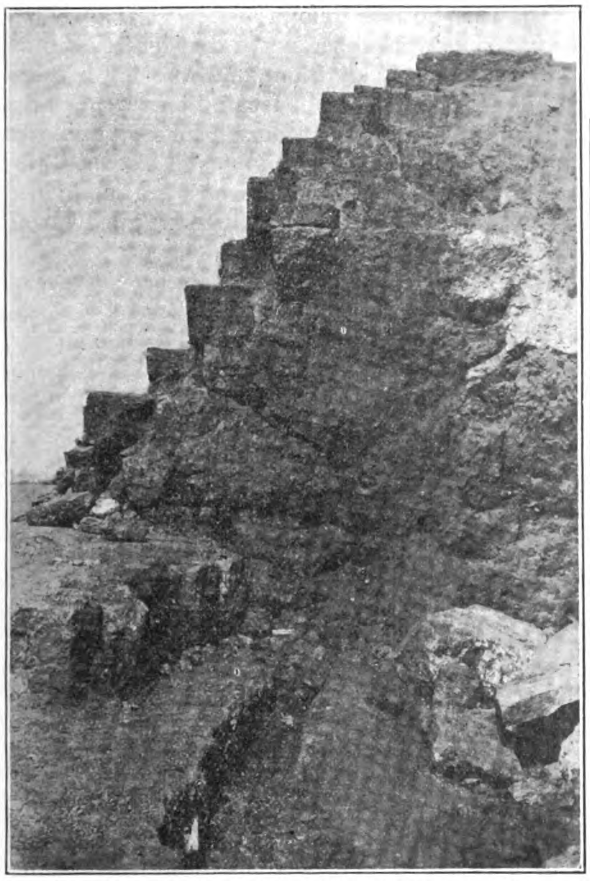
IN the course of our famine relief operations I had occasion to visit the city of Hsiang Yang, where we were carrying out some dyke repair work, and I think a short note on it may prove of interest.

I would like to refer first to an account of Siang Yang written by the famous Italian Marco Polo in the year 1295, when he committed to writing the history of his twenty old years sojourn in China.

The first shot proved lucky, for it crashed into one of the principal temples with such violence as to destroy it, and bury many of the citizens in its ruins.

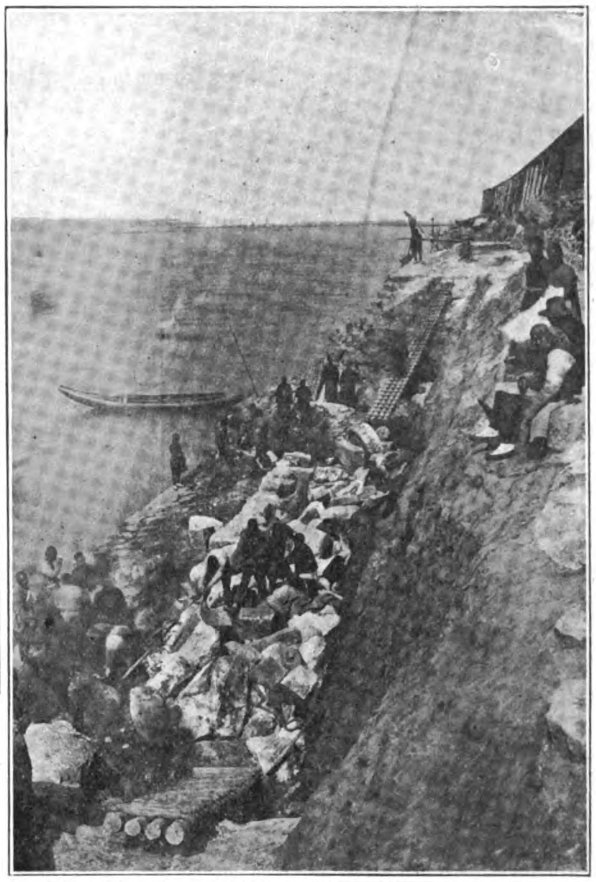
Terrified by this occurrence, which they attributed to the vengeance of the gods, the inhabitants made haste to sue for peace.

That this account is authentic there can be no doubt, both from the local legends, and from the constructive work shown even in the present day on the water front which we were repairing.



The Massive Stone River Wall Protecting the Ancient City of Hsiang Yang on the Han River

Face View of the Ancient Stone River Wall of the Han River at Hsiang Yang



Repairing the old Hsiang Yang River Protection. The Walls of the City fall sheer to the River

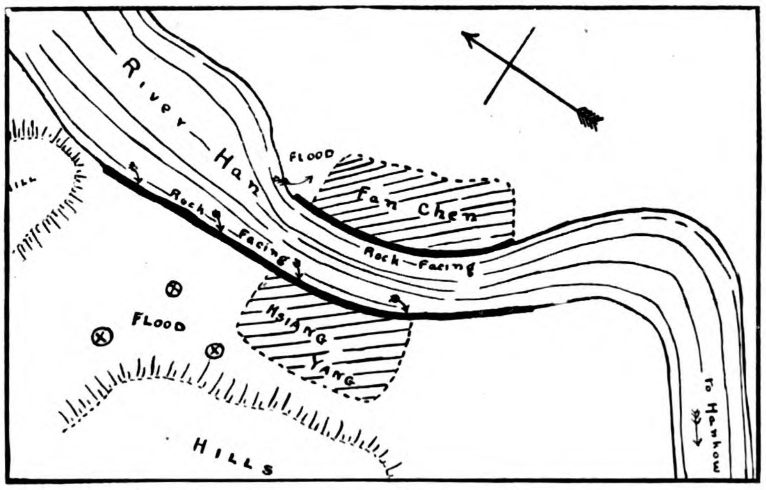
The emperor of the period was the famous Kublai Khan, who was then endeavoring to conquer the southern part of China, which was still in possession of the old Chinese Sung dynasty.

The city of Hsiang Yang was the key to the situation, and for four years it resisted all attacks.

Nicolo, the father of our historian, was then in residence at the imperial court, and he and his son approached the emperor and proposed to him the construction of 'mangonels' or stone-throwing machines such as were used by the Romans and other ancients in the siege of fortresses.

This proposal met with approval, the more so as all attacks on Hsiang Yang and its sister city across the river had proved useless.

With the aid of certain Nestorian Christians the machines were built and conveyed to the front by rafts, where they were prepared for action.



Han River Conservancy Work at Hsiang Yang

The rock facing is of the most massive nature, the blocks five and six feet in length, and the depth of the work some ten feet in many places, while the river frontage thus protected is over two miles.

Nor is it confined to one side of the river only, for the city of Fen Chen on the opposite side of the stream is similarly protected.

The sectional photo shows the damage done by the floods of last year, which had sufficient force to destroy the work of centuries, and hurl the masses of rocks across country or miles down stream.

The construction as carried out by local contractors under our direction presented some points of interest, notably in the form of cement used.

This grouting is composed of a mixture of lime, earth and a

rice soup, which is poured into the cracks and used as backing, and when dry appears to acquire an extraordinary solidity.

It will not set under water, but seems to be impervious to moisture when set, and is interesting moreover from the fact that it is the same compound as was used by the builders of hundreds of years ago, as far as one can judge.

The illustration shows the work in progress, with the walls of Hsiang Yang falling sheer to the river on the right, and the houses of the modern city of Fan Chen in the left background.

The blocks that we employed were of a fair size, as can be seen, but they were in no way comparable with those of the by-gone times, and it is an interesting comparison between the government of ancient days which was willing and able to devote millions of money to work of public welfare, and the feeble policy of the present day which has to rely on the efforts of outsiders in the shape of famine relief commissions.

Nowadays the city of Hsiang Yang is only the residence of the officials and some of the older gentry, the trade having all been transferred to Fan Chen, where they have the telephone, an aerated waterworks, and other inconveniences.

The river here is some six hundred yards wide, and the danger is due largely to this, as the channel above the cities has a breadth of over a mile, and the consequent constriction of flood water is very great.

The overflow has caused damage at the points indicated with an arrow, and at one time threatened to envelope the city of Fan Chen entirely, while some years ago it actually penetrated behind Hsiang Yang on the hill-slopes as marked by a cross.

It is curious that such an engineering construction should have arisen in some ways, for the builders of old time were fully as perspicacious as those of the present day, and must have foreseen the danger, but it appears that they estimated the risk as being worth it, for the native city of Hankow is placed in just such a position of jeopardy from the constricted area at the confluence of the rivers Han and Yangtze.

One point which I noticed during the construction work, and that was the apparently insecure foundations of this rock bunding, which did not penetrate more than a few feet below water level, and which has no excuse such as a rock foundation upon which to build.

Further experience showed that this is general upon the Han river, and the same may possibly apply to other conservancy construction in other parts of China which I have not seen.

With regard to the footings of the work at Hsiang Yang, the masonry was laid on wooden piles six inches in diameter, and having a penetration of upwards of fifteen feet, which should last for some years, as they are under water and therefore not exposed to destructive wear and tear.

The total cost of repairs carried out amounted to only forty thousand dollars, of which part was on loan, and part was represented by the materials, which were provided by the local and provincial officials on behalf of the authorities.

The Yung Ting Ho

The Yung Ting river has its sources in the province of Shansi, and passes thence through the Western Hills, under the shadow of which it runs with ever increasing velocity, gathering sand and gravel as it goes, until it emerges in the neighborhood of Peking at the famous Marco Polo bridge.

Owing to the fact that it is thus confined by hills, the conservancy officials make no attempt to handle the river until it reaches the vicinity of the bridge, and it was at this point that my own observations commenced.

The area covered by the board extends from Marco Polo bridge to the city of Tientsin, a distance of some three hundred *li* on each bank, and they organize the work as follows:—

There are four divisions, the upper north division, the lower north division, the upper south division, and the lower south division, located on the northern and southern banks of the river respectively.

The divisions are subdivided into sections, five to each division, giving them a length of some twenty *li* or more, a convenient unit of work to cover.

Each section has an engineer, an inspector and two assistants, while at No. 3 section in each division is the divisional engineer.

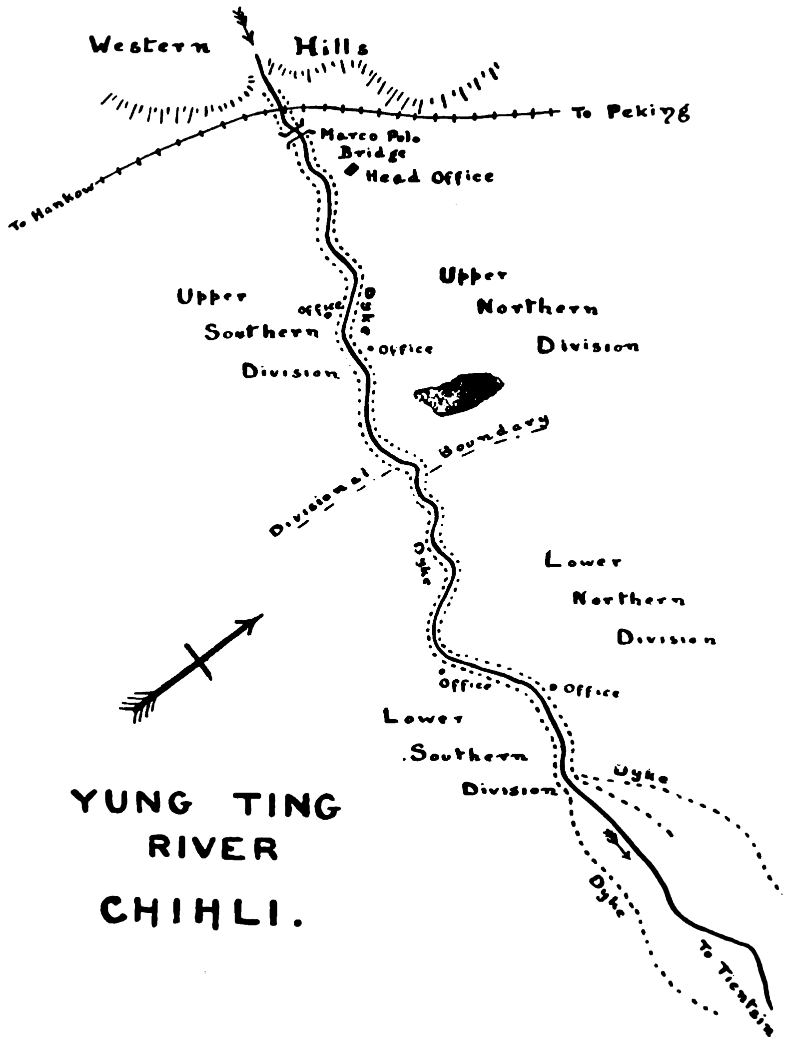
The head office is at the town of Liu Kow Chiao, near the Marco Polo bridge, and all the sections and divisions are in touch with headquarters by means of a private telephone, so that any danger can be reported immediately.

With regard to the nature of the work, stone facing of the dyke can only be done on No. 1 section of the upper southern and upper northern divisions, owing to the cost of transportation of stone from the quarries in the hills.

The rest of the facing is done in the following manner:—

Large branches of trees are cut, tied with rope at their butt ends, and suspended in the stream on the face of the bank.

Piles of *kaoliang*, tied in bundles, are laid on the river front, in layers five feet thick, and covered with a one-foot layer of earth, the whole being pinned down by twenty-five foot piles.



Yung Ting River, Chihli

The bed of the river being shallow there is practically no undermining, and the dyke has a height of only some fifteen feet at most, with the result that this type of brush work seems to answer very satisfactorily.

The chief difficulty lies in the sandy nature of the soil, which cannot be tamped, and also in the fact that the river rises with extreme suddenness, so that at night it may have a channel a hundred yards in width and in the morning this may have swelled to three-quarters of a mile.

The width between dykes varies from half-a-mile to a mile and a half, and the rapid rise and fall of the stream renders it necessary to watch the doings of the river with particular care, in order that a few hours warning may be given at threatened points.

The bed of the river lies some ten feet above the surrounding country, but I should suppose that the sedimentary and sandy nature of the flood tides renders the use of water gates for irrigation purposes impossible.

It appeared that the construction work was fairly well carried out, though I do not think that any full estimates of work required are prepared, the job that threatens danger being attended to as it comes along, and the materials in the various areas being bought more or less on speculation, as I observed that continued exposure to the weather had considerably deteriorated the quality of the ropes, *kaoliang*, brushwood, piles, etc.

It was not until I began to investigate the financial conditions and the personnel that I realized that I was indeed in China.

Each section has four on the staff, five sections to a division, plus the divisional engineer, yet the payroll for the whole division was only $624 per month, an allowance of $30 per engineer.

How can honesty and a straight policy be expected under these circumstances, for it is obvious that no one can live on such an allowance.

Then I found that each division carried a permanent laboring staff also, at a monthly rate of something under $400.

This seemed a reasonable idea, until it transpired that there were two hundred and fifty on the payroll, an average of a little more than a dollar and a half per month.

It was explained that the men were allowed to go about their farming when not needed, and that when they were needed their food was provided on the job, and that they were supposed to have certain rights of cultivation of conservancy land.

This appears a most unsatisfactory system from a western point of view, as it renders it extremely difficult to check up expenditures, calls for a payment to unnecessary men at slack times, and does not cover the number required in an emergency.

The work is being done, and not neglected, as is the case on some other rivers, while when one considers that the staff is seven months in arrears of pay the honesty of the staff in carrying out their work is rather surprising and certainly very creditable to all concerned.

The Manila Railway Company

THE annual report for the year ending December 31st, 1921, shows a total length of road in operation of 1,031,549 kilometres (of which 13,586 is double track) with 21.99 kilometres under construction. The equipment shows 35 passenger, 49 freight and 71 combination locomotives, a total of 155, with 197 passenger coaches and 52 baggage and express cars, and a total of 1,831 freight cars of all classes.

The income account statement for the year is as follows :

Operating Income	Year 1920. Pesos	Year 1921. Pesos
Railway operating revenues :		
Transportation—rail line ..	11,568,011.95	11,978,509.32
Transportation—water line ..	267,294.73	192,484.52
Incidental	131,093.82	103,304.85
Non-operating Income		
Hire of freight cars	1,713.92	1,566.57
Rent from locomotives	2,251.00	484.25
Rent from lease of road	—	—
Miscellaneous rent income	8,219.65	3,577.72
Dividend income	—	—
Income from funded securities ..	4,337.00	2,190.88
Income from unfunded securities ..	327,658.11	203,178.27
Miscellaneous income	6,385.75	2,976.27
Total	12,316,992.93	12,488,272.65
Operating Expenses		
Railway operating expenses :		
Maintenance of way and structures	2,160,627.13	2,013,172.54
Maintenance of equipment ..	838,815.34	1,085,923.78
Depreciation of equipment ..	349,875.88	393,887.95
Traffic	39,444.16	48,270.23
Transportation—rail line ..	5,738,660.09	5,217,868.59
Transportation—water line ..	289,954.96	280,672.85
General	507,569.41	632,513.80
General	507,569.41	632,513.08
Transportation for investment ..	(58,830.48)	(165,502.62
Other railway operating expenses :		
Railway tax accruals	8,078.36	—
Uncollectible railway revenues ..	126.37	262.85

Deduction from Gross Income	Year 1920. Pesos	Year 1921. Pesos
Hire of freight cars	—	103.95
Interest on funded debt	2,430,800.00	2,572,877.38
Interest on unfunded debt.. ..	68,000.77	140,839.80
Income applied to sinking and other reserve fund	4,488.00	4,488.00
Total	12,377,609.99	12,225,379.10
Balance transferred to profit and loss	(60,617.06)	262,893.55

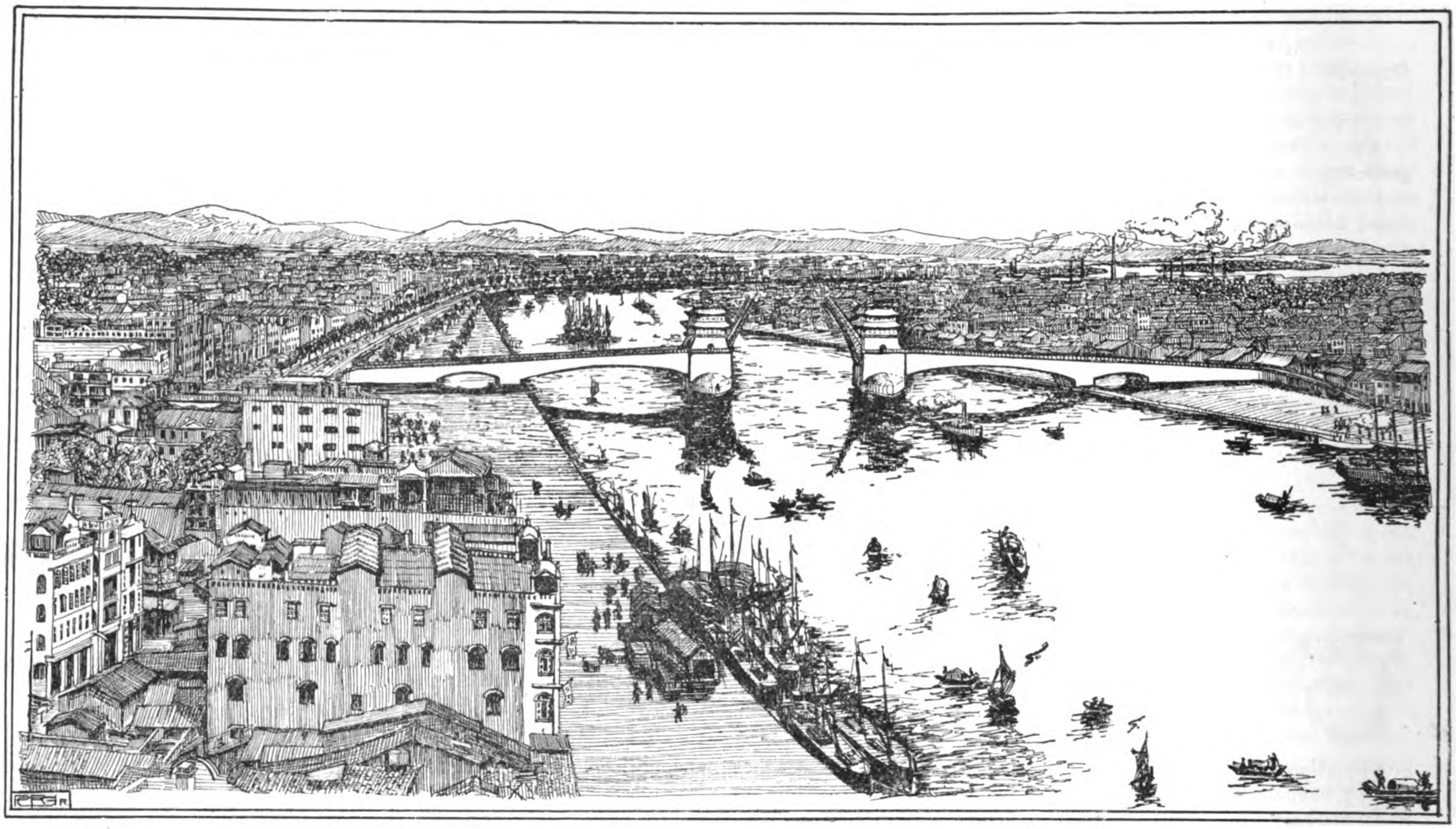
Express receipts declined slightly due to financial stringency and the loss of business to auto-trucks on short hauls. Train messenger service established during 1919 is becoming more efficient and attractive to shippers.

The directors recommend that the express service be expanded and made to cover C. O. D. business which will facilitate provincial producers in reaching the larger markets as well as increase the distribution of manufactured articles. The possibility of establishing delivery trucks in the Manila district should also receive careful consideration.

The opening of the Ragay gulf route following the completion of the rail lines from Calauag to Aloneros and from Naga to Pamplona during the latter part of 1921, and placing the steamship *Borongan* in operation between Aloneros and Pasacao will undoubtedly prove attractive, especially to the Bicol provinces. A through passenger, freight and express service is being maintained and is proving beneficial to the Legaspi division earnings.

The train service between Noveleta and San Roque, province of Cavite having been abandoned under legislative authority, and the rails removed, an auto-truck service was established, owned and operated by this Company. The first truck was placed in operation during March, 1921, and another truck was added during May. The trucks to the end of December handled 49,170 passengers with receipts of P.9,834 and expenses of P.10,212.98 which does not include depreciation and interest on the investment. The present rate of fare is 20 centavos which should be increased.

Auto-truck competition has increased at an alarming rate during the year, especially in the districts adjacent to Manila. The lack of supervision over auto trucks by the public utility commission makes the competition extremely severe and this competition can be met only by reducing the fares or providing more frequent and cheaper railroad transportation. This can probably be accomplished by installing on designated rail lines motor propelled coaches.



Proposed Bridge Across the Pearl River

THE following project for a bridge to connect Canton city proper with Honam island has been worked out in connection with a plan for improving the front reach in the Pearl river by Major G. W. Olivecrona, engineer-in-chief to the board of conservancy works of Kwangtung.

The question as to whether this bridge should be constructed as a high-level one providing clearance for vessels with masts, or as one of low-level with a movable span, has been discussed for some time by the public as well as in engineering circles. A low-level bridge with a bascule span has been considered to be the most suitable type in this case for the following reasons :—

1. The future extension of the Canton harbor will follow the shores of the back reach where deep water is to be found. Ocean-going masted vessels which can enter the harbor only through this reach will, with very few exceptions, moor here and never have to pass the bridge.
2. The approaches to the bridge would be limited each to 232 m. in length as compared with a length of 580 m. respectively, if a high-level bridge were chosen. The low bridge would, therefore, avoid the occupation of valuable private land, as the approaches could be laid out on ground reclaimed from the river.
3. The bridge would have a free height at high water level of 14 m. under the bascule span and would thus permit local river steamers, tugboats and all smaller craft to pass without necessitating the opening of the bascules.
4. A low-level bridge of heavy substantial structure, built of reinforced concrete would be more in keeping with the surroundings, compared with a high-level bridge which would have to be constructed of iron trusses, built to a height of about 27 m. above H.W.L.
5. A low-level bridge constructed of reinforced concrete for which all materials, with the exception of the movable span, could be obtained locally, would eliminate the necessity of buying expensive materials from abroad.

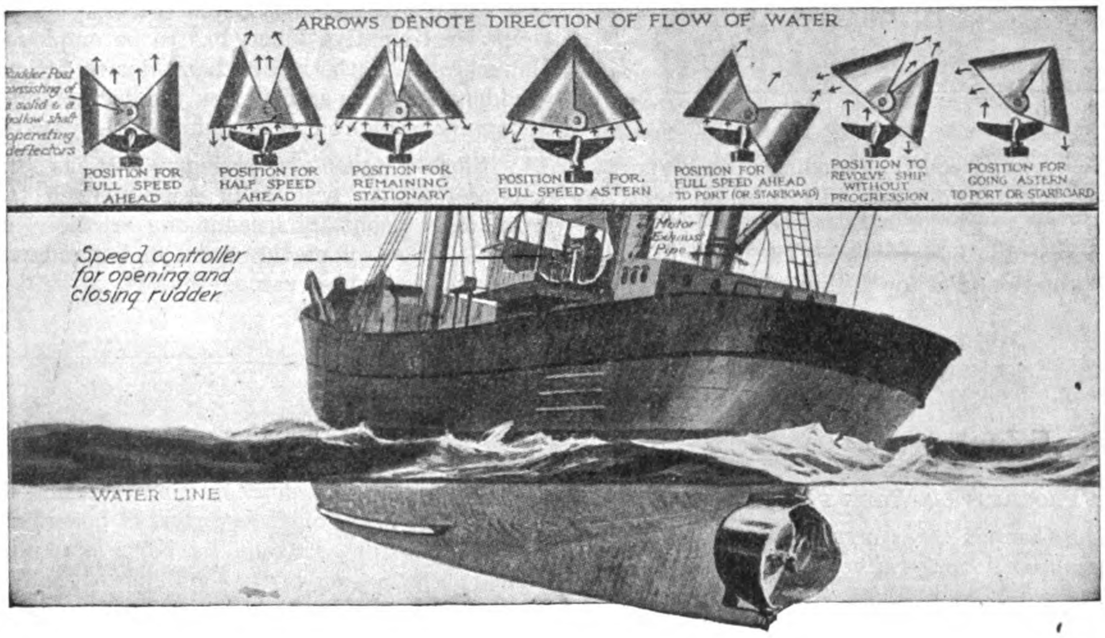
Those who oppose the construction of a low-level bridge argue that the movable span when in operation would put a complete stop to all traffic over the bridge. This is of course true, but if the periods for the opening of the bascules should be selected during the nights and early mornings when the flow of traffic is at its lowest, the inconvenience would not be much felt. With modern construction and appropriate machinery, the time for opening or closing the leaves would only cover a period of a few minutes.

The specifications for the bridge have been proposed as follows : Number of spans three, two of which are to be stationary, and to have a free opening of 59 m. from pier to shore and a height in the centre of 11 m. at H.W.L. The third span is to be movable in accordance with the bascule type, with a free opening of 45 m. between the central supporting piers, and a height in the centre of 14 m. at H.W.L. The width of the bridge between side railings should be 18 m. The price has been estimated to cost H.K. $2,-160,000. This includes the cost for the deepening of the river at the selected site for the bridge.

Kitchen's Reversing Rudders

IT is a remarkable fact that with all the wonderful scientific improvements which have been embodied in the construction of the modern power-driven ship, the type of rudder in use to-day is practically the same as in the days of the Vikings. It is true that inventors have from time to time evolved various forms of ships' rudders, with the object of improving the steering and manœuvring capacity of the ship, and some have also aimed at obtaining a braking effect by means of the rudder, but the only invention which so far has proven itself a success and has completely satisfied commercial requirements, is the ingenious rudder designed and patented by Mr. J. G. Kitchen, of Lancaster, England.

This invention gives all the advantages previously sought for, with the important addition of the power of bringing the vessel to a dead stop or of reversing the direction of the course without altering the speed or direction of the engine or propeller. In other words, Kitchen's reversing rudder is capable of manœuvring and reversing the direction of a ship from the bridge, without reference to engine-room. This is a most important safety factor and should appeal to all practical men, as it will have an important bearing upon future navigation. It is also most important to remember that the control of the helm is in exactly the same way as with an ordinary rudder by steering wheel or tiller and that therefore the present invention is not likely to create any confusion in the wheel-house. A separate and independent hand wheel is provided by means of which all speed variations and reversing is carried out.



This wheel corresponds to the operation of the old-fashioned gong and jingle or bridge to engine-room telegraph with the very important difference that with Kitchen's rudder immediate and direct action is obtained whereas in the other the older from only indirect and much delayed action is obtained a delay which might result in serious consequences.

The action of Kitchen's reversing rudder is such that the direction of thrust never changes, whether the vessel is going ahead or astern, consequently the excessive vibrations and wear and tear, which are unavoidable under ordinary conditions of reversing, disappear entirely when Kitchen's reversing rudder is used.

The essential parts consist of two curved deflectors which partly enclose the propeller. Both deflectors are pivoted at the top and bottom on common centres. One of the deflectors is operated by a solid shaft, and the other by a hollow shaft concentric with the solid shaft. By simple mechanism the deflectors or rudders are made to turn together in the same direction, or equally in opposite directions.

The diagrams show that this rudder gives at all times direct and instantaneous control of the speed and course of the vessel. The engines continue to run at full speed ahead or at their most economical speed while the vessel slows down, stops, goes astern or carries out any other manœuvre required in an emergency or in the ordinary course of navigation.

It has been found that a vessel can be turned on its own centre without proceeding either ahead or astern and when going full speed ahead can be stopped in approximately its own length the time taken depending partly on the rapidity with which the rudder is closed and partly on the ratio of power to displacement.

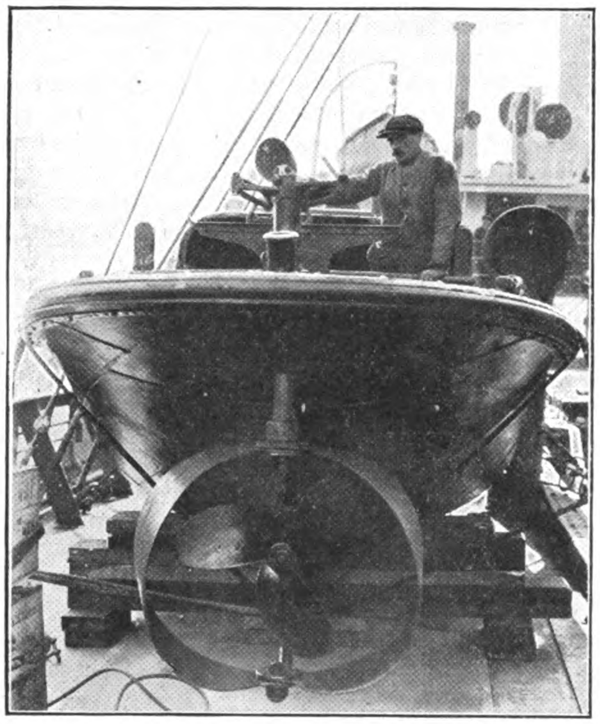
The rudder is applicable to all classes of vessels single of twin-screw and is controlled either by lever, tiller or steering wheel. An indicator is provided showing position of the rudders for speed variations. For large installations it is necessary to introduce power for the steering and operating of the rudders and power operated gears and controls have been designed for either steam, hydraulic or electric.

The Kitchen's reversing rudder was recently fitted to the Spanish coasting vessel the *Alca*, a steel vessel of 500 tons' displacement, 140-ft. long, 22-ft. 5-in. beam and 10-ft. moulded depth fitted with 150 B.H.P. Sulzer Diesel engines but without reversing gear or clutch devices of any kind. The propeller of the vessel is 4-ft. in diameter.

The opening and closing of the rudder and consequently all speed variations and reversing are regulated from the control hand wheel placed in wheel-house and these operations are, of course, quite independent from the control of the helm which is as with on ordinary rudder maintained by steering wheel. The time taken to bring the vessel from full speed ahead to dead stop is 34 seconds and the distance traveled 200-ft. The diameter of her turning circle at full speed ahead was 140-ft. as the time taken to spin about an axis amidships through a half circle was 1 minute 25 seconds. Although the sea speed of the vessel is only 6¼ knots the control proved very efficient and rapid in operation and the boat performed complicated manœuvres with ease.

With the growing demand for internal combustion engines for marine propulsion many difficulties have to be overcome arising out of the high speed of these engines. The problem of slow running and quick and efficient reversing have for a considerable time been engaging the attention of experts as it is generally accepted that reversing directly by the engine or by reversing gear is mechanically objectionable causing abnormal shocks and stresses in the machinery and to the structure of the vessel, excessive vibration and consequently heavy wear and tear on hull and machinery. This difficulty is entirely overcome by Kitchen's reversing rudder, as no reversing gear or clutch of any kind need be fitted. One man can easily run and control the ordinary motor boat because when once the engines have been started he need not leave the steering wheel, but can obtain all speed variations or reverse the course of

the boat, by means of a control wheel within easy reach giving immediate and direct action on the rudder. This means, of course,



improved engine efficiency and economy, reduced wear and tear on hull and machinery, and improved steering and manœuvring qualities.

A further very important factor is also the protection this rudder affords to the propellers and the saving in machinery space as no reversing gear is required. The machinery need only consist of engines, shafting, thrust bearing and propeller, the latter being solidly connected with the engine.

It is often necessary, as for instance, with trawlers and fishing boats to maintain a slow but efficient speed and it is not practicable to slow down on oil engine sufficiently.

With Kitchen's rudder the speed of the boat may be controlled and regulated from the steering position to a fraction of a knot with the engines running at their most economical or lowest reliable speed. The rudders also afford complete protection to the nets from any entanglement with the propeller. It is of very great value with oil engines to be able to run them for long periods at a constant speed thereby reducing to a minimum engine trouble and breakdowns.

The Kitchen's reversing rudder shows to best advantage when applied to tugs and canal boats when quick response to the helm combined with perfect and instantaneous control of speed reduces to a minimum all dangers of manœuvring in congested waterways and avoids any sudden pull on the tow rope which might cause breakage. The power may be accelerated from rest as gradually as may be desired allowing the vessel to proceed at the lowest possible speed and to remain under perfect control all the time.

The Kitchen reversing rudder has also proved itself very successful in launches used on the west coast of Africa where inexperienced native labor has to be employed for running these launches with the result that prior to fitting Kitchen's reversing rudders the wear and tear on the engine and reversing gear were excessive owing to lack and skill on the part of the natives.

Since Kitchen's reversing rudder has been accepted the native engineer's duty practically resolves itself to keeping his engine running at a constant speed in one direction while the steersman has complete control of the speed and manœuvring of the boat independently of the engine.

Peking Electric Tramway

(Schedule of Progress of Work for 1922-1923)

From the time the Company was organized to August 1922, the following work has been done :—Survey of lines. Completion of drawings of lines.

Contracts for purchase of materials.

First payment of contract. Call for tenders of power station, converter station, car-shed and repair shop buildings. Testing of reinforced concrete trolley poles.

From August 15 *to* 30.—Construction of poles. Testing of water source for power station.

From September 1 *to* 30.—Arrival of boiler and principal machinery foundation plans. Opening of tenders of power station, converter station, car-shed and repair shop buildings. Call for tenders of ballast for road bed. Construction of car body (at Company's shop).

October 1.—Construction of power station, converter station, car-shed and repair shop building begin. Opening of tenders of ballast. Erection of trolley poles begins.

October 30.—Arrival of first lot of 1,100 tons steel rail.

November 1.—Transportation of ballast begins.

November 30.—Second lot of 1,600 tons steel rail arrive.

December 1.—Machine shop equipment arrive.

December 15.—Construction of building stops.

December 31.—Forge shop equipments arrive. Crane and miscellaneous equipment arrive. Boilers and parts of electric machinery arrive. Preparation of traffic regulations.

January 15, 1923.—Paint shop equipments arrive.

February 1.—Training of motormen. Upper frames of truck arrive. Laying of track begin.

March 1.—Building construction resumed.

March 15.—Complete arrival of boilers and electric machinery and accessories. Erection of boiler and piping begins. Part of truck shipment arrive. Assembling of car body and truck begins.

March 31.—Erection of turbine started. Remaining portion of steel received.

April 15.—Erection and connection of switchboard. Winding shop equipment arrive. Repair shop transmission and shafting arrive. Erection of repair shop machinery. Trolley wires arrive.

May 1.—Transformers and accessories arrive. Erection of converters. Stringing of wires started.

May 15.—Delivery of truck completed.

May 31.—Erection of poles and car bodies finished.

June 30.—Construction of power station, car-shed buildings finished. Track laying finished.

Tramways for Kowloon. A correspondent at Hongkong of "The Times Trade Supplement" writes : The government appear to have decided to sanction the construction of tramways in Kowloon. To begin with about seven or eight miles of track will be laid, but Kowloon is spreading so rapidly that it will not be long before there will be twenty to thirty miles of track once a beginning is made. The plan favored at present is that of leasing the concession. Whatever arrangements are made, one result will be more work for British engineering firms.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI, CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, SEPTEMBER, 1922.

Facing the Facts

"If the Chinese government without aid from the outside could not or would not save China, then the great powers in common would be compelled to take united action to aid in saving her. With an anarchic or impotent China before them the powers could not pass by on the other side. That was too vast a menace, not only to their own interests, but to the peace of the world."

(From Minister Schurman's Speech at Peking, September, 1921)

THE Chinese people need a friend. Their government is defunct. Anarchy reigns throughout the provinces. There is no responsible head to any ministry. One man stands at his post fighting the inevitable. The minister of foreign affairs still officiates, receiving protests, complaints, demands, bills and abuse from the diplomats of all other nations.

The fears expressed by pessimists have come true. China has refused to put her house in order. She has failed to abolish civil strife and develop a stable and effective government acceptable to her own people as well as foreign nations. She stands a menace to herself, to her neighbors and the peace of the world. Her weakness and disorganization has permitted the Soviet to establish its rule in Mongolia and her scholars are now sitting at the feet of the high priest of Bolshevism addressing him as "Master." Her failure to meet the interest and principal on outstanding loans has destroyed her credit abroad. Her refusal to pay legitimate bills to private merchants for materials ordered and delivered threatens the stability of many of the largest foreign concerns in China.

Dr. Wang Chung-hui, Acting Premier of the Chinese Government

Dr. Wellington Koo, China's Minister of Foreign Affairs

In the darkest hour of China's financial troubles, the burden of staving off bankruptcy is thrown on the shoulders of these leaders of the Young China party.

The Peking government has lost the confidence of its own bankers and investors, closing the door to any further assistance from within. It has played false to its friends and hypothecated over and over again revenues previously set aside for the service of other loans. The salt surplus is but a tradition, and it is said that the gabelle faces a deficit of over $2,000,000 for the current month. Peking officials have defaulted, absconded, forged and stolen in order to keep the gang of militarists in power. They have printed unauthorized domestic loan bonds and sold them to an unsuspecting public. Not content with fleecing their own people they have attempted to swindle the foreigner by using these forged notes as security for advances. In one instance, the vice-minister of finance actually succeeded in raising $400,000 from a foreign bank on the security of $575,000 worth of these spurious bonds. Luckily, the manager of the bank had the wit to make an immediate investigation and discovering that the numbers on the bonds were unauthorized, stopped payment on the compradore order. It had been already cashed at a native bank.

Story after story is told of other lapses from official honesty on the part of Peking job-holders forced into crime in order to satisfy the greed of their military overlords, or, in many cases, to fill their own pockets while the filling was good. The foreigner has been milked, bilked, stung and trimmed at every turn. Over two hundred thousand dollars in squeeze were extracted in one painless operation from foreign firms in Peking in exchange for forged orders for railway materials placed through a foreign bank, which were at once repudiated by the managing director of the railway concerned. The Peking mandarins have stooped to trafficing in human misery, appropriating relief funds contributed by foreign charity for feeding the starving millions of the North. Roads built from the proceeds of these famine funds are now impassible. The millions expended upon their construction have been wasted. All loans not secured upon the customs and salt revenues may be said to be worthless, a charge upon the good faith and integrity of the Chinese people.

Aside altogether from the many defaulted foreign and domestic loans there exist the more immediate debts owed to foreign mercantile firms in China who are hard pressed to meet their obligations through the refusal of the Chinese authorities to pay up or even consider the matter of issuing bonds or treasury notes that could be used to satisfy the carrying banks. Millions of dollars' worth of materials have been delivered in fulfillment of official contracts, and as many more millions' worth of materials are piled up at the ports awaiting payment and acceptance. Large orders have been placed by official intermediaries, the squeeze collected, and on the arrival of the cargo, the intermediary has disappeared, and the officials have repudiated the contract. A list of the foreign firms who have been hit the hardest would embrace many of the most important hongs in China. Owing to a natural disinclination to court publicity, it is difficult to make an accurate estimate of the amounts due to these concerns, but it is safe to state that not less than $40,000,000 is involved. Some of these accounts for railway materials run as high as ten million each. Shipments ordered last year are piled up at the ports where the firms who executed the orders have been compelled to rent land for storage purposes and surround it with armed guards.

Unless these unsecured debts are paid within a reasonable time, foreign firms in China can prepare for another catastrophe before which the crash of 1920 will appear insignificant. The market has never recovered from that break, and another blow at this time may precipitate the failure of firms who have gallantly weathered the

storm relying on the traditional honor of the Chinese to pay their accounts in full. When, two years ago, the Nishihara loans to the extent of over $200,000,000 were repudiated by Peking, the anti-Japanese element applauded this act as highly patriotic, evidence that China still possessed considerable virility and courage. China was being taught how easy it could be done, and to-day the shoe is on the other foot. The other fellow's ox has been gored, and American and British firms are paying the penalty for their blind faith in the *bona-fides* of the Peking mandarinate.

As far as this pertains to American firms, we hold to the conviction that they are not solely to blame. The fault lies with those responsible for initiating the campaign that induced American firms to rush into the new commercial *eldorado* in order to capture the trade by sheer weight of numbers. It is necessary at this time to emphasize these activities, as they constitute a precedent that compromises the American government to take effective steps to protect the interests of those who accepted its advice. There was a time, under a previous administration, when appealed to for protection to American lives and properties in Mexico, a secretary of state could safely answer: "The American government has many more important matters to attend to than bothering about Americans who could not make a living in their own country." Americans were not officially invited to colonize, develop and invest in Mexico, or other countries. They *were* officially urged to come to China. The American government therefore cannot escape its responsibility. The present administration must accept the obligations imposed upon it by the policy of its predecessor, and stand firmly behind its traders who entered the Chinese field and extended credit to a government they were taught to believe could "pay spot cash for everything it purchased, if it so desired."

If American firms are forced into bankruptcy by reason of the failure of the Chinese government to pay its debts for merchandise and materials, or because of its unwillingness to issue notes in order to enable its creditors to seek relief from the carrying banks, the effect upon China will be disastrous. The loss of American sympathy, support and credit may well lead to foreign intervention in the collection of China's revenues, at least, such of these as may be most readily collectable. Americans have learned well their lesson, but we repeat, the government must stand its full share of the responsibility and exert itself by taking active steps in initiating some measure that will bring order out of chaos and stability out of insolvency. Aside altogether from the more important phases of the political situation, it owes that much to its own nationals. It also owes something to the other powers, who have accepted the Hay doctrine and refrained from collecting their own debts in the usual manner. It is hardly to be expected that other nations will willingly accept the extension of the Monroe doctrine to China, which has protected defaulting South American states against occupation by the armed forces of powers whose subjects have been openly robbed by unscrupulous military dictators. The time must arrive when the American government must either take the initiative in proposing some way out of the Chinese muddle, or step aside while other powers bring their own pressure to bear upon China for the collection of legitimate debts.

The present situation is intolerable. If China is permitted to dawdle along and solve her problems in her own way and in her own good time, without the offer of a helping hand, the chances are that the existing chaos and anarchy will in time equal, if not surpass, the debacle in Russia. As Minister Schurman concisely put it, "an anarchic and impotent China is a menace to the peace of the world," something that the other powers in self-defense could not pass by. Especially is this true in so far as her immediate neighbors, Japan, Great Britain and France are concerned. They would be the first sufferers from the spread of anarchy in Asia. From her safe distance America can afford to view these matters from a detached and altruistic standpoint. The conflagration is not likely to disturb the even tenor of American life and prosperity. The other powers, however, are in a dangerous position and sooner or later must act to protect their interests.

The time has therefore arrived when America must shoulder the responsibilities imposed upon her by the Hay doctrine and the treaties arising out of the Washington conference, and as the friend of China, take the initiative in placing into practice the doctrines she has advocated and upheld for the past two decades. It may mean the calling of another conference, the arriving at another international understanding that will give effect to the Washington treaties and preserve China for the Chinese, insure the peace of Asia, of the Pacific, and of the world. For just so sure as China is permitted and encouraged to drift into further chaos and bankruptcy, a situation will arise calling for energetic action by some individual power whose own vital policies will be jeopardized by such conditions, and then international co-operation in a military sense will be precipitated on a large scale in order to avoid the re-establishment of the spheres of interest.

Unless the American people are willing to participate in a military occupation of China they must be prepared to throw overboard their traditional policy of the "open door" and accept the temporary impairment of China's administrative independence by other powers until such time as their just debts are collected. At all events, unless the Chinese unaided overthrow the rule of the *tuchuns* and establish a government satisfactory to themselves and the other nations, the American people must face the possibility of eventual participation in an armed occupation of the principal interior cities of China as the only safe guaranty that the country can again be placed on its feet as a going concern. It is to be hoped, however, that before such a drastic solution to present anarchic conditions is discussed seriously by the powers, that the Chinese, recognizing their own impotence, will of their own accord, invite such friendly foreign co-operation in order to enable a stable government to impose its will upon the gang of military freebooters who now hold the people at their mercy, and so permit the collection of revenues without which no central government can function and discharge its international obligations. That the situation is gradually drifting towards the imposition of a receivership over China's revenues is a fact patent to all impartial observers. Unless the Peking government is able to meet its mid-autumn obligations, an official announcement of bankruptcy cannot be long delayed.

What is the solution? The answer to this question is unanimous. An "international debt commission," "international financial control," "a receivership" "foreign audit and supervision over the collection of revenues"; they all mean the same thing. How is it to be brought about? Ask the average observer in Peking and he will wring his hands and admit the difficulty of applying the remedy. The impression gained after interviewing the wise ones in Peking, is that no foreigner dares to incur the enmity of the Chinese by openly advocating a solution they all privately admit is inevitable.

Foreign sentiment in Peking is swayed by its environment; the news that emanates from the press bureaus is ninety per cent. pure propaganda. To a man, foreigners in Peking look up to Wu Pei-fu as the savior of China, closing their eyes to the fact that his power is derived from pocketing state revenues to an amount estimated at anywhere between $25,000,000 to $50,000,000. In addition, he is charged with extorting over $10,000,000 in the past year, through forced levies on the people of the provinces under his control. The "Hope of China" has materially contributed to plunging the government into bankruptcy, yet the Peking claque defends these peculations, while villifying Chang Tso-lin, Sun Yat-sen and other *tuchuns* for resorting to the same practices. On the other hand, foreigners in Manchuria swear by Chang Tso-lin and while Sun Yat-sen was in power at Canton the verdict was unanimous that his rule was most liberal and beneficient. Wu Pei-fu has had the advantage of being closest to the news centre and of having several newspaper correspondents on his staff of advisers.

Nothing matters to this group but Wu Pei-fu. The interests of China and of their own countries, are subordinated to its personal hopes and aspirations. It selected Wu to take the place of Li Shun whose untimely death upset its previous plans, and have since boomed him, advertised him, sung his praises and literally rammed him down the throat of China, and through control of foreign news agencies, compelled the world to accept him at their own estimation. Immediately after the defeat of Chang Tso-lin and installation of the new puppet president, this *bloc* launched the drive for the negotiation of a large foreign loan to enable their favorite to consolidate his power and at the same time provide the funds which would ensure the prompt payment of overdue salaries without which the *bloc* could not exist. The fact that Chang's Manchurian armies were still intact preparing for another test of strength and that Sun Yat-sen retained his political prestige and power in the South, counted for nothing with the *impresarios* directing the activities of the Kin-Han war-lord. They refused to see that any loan at this time to Wu Pei-fu would only be dissipated in financing further military operations under the pretext of forcing unification at the point of the bayonet, an invitation to prolong the civil wars which have brought China to her present deplorable plight. Lending money to Peking before unification of all political parties is like pouring water through a sieve. The more that is loaned the longer internal strife will continue. A loan to China prior to the establishment of a stable government representative of the whole country is putting a premium upon civil warfare, a crime not only against the Chinese people, but a betrayal of foreign investors influenced to believe that all is well in Cathay.

Li Yuan-hung had hardly taken his seat in the puppet presidential chair, when the consortium representatives in Peking were approached for an advance of $2,500,000 per month to defray administrative expenses, to be secured on the increased customs revenues. Although the ministers of the consortium powers concurred in that some financial assistance to China should be considered, the Japanese minister took the firm and sensible stand that any advances pending complete unification would constitute an unfriendly act, a direct intervention in the internal affairs of the country. At this time, we are informed, the Chinese were willing to approve of international audit and control over their foreign loans, utilizing the estimated increased income from the new customs tariff now under revision as security for a bond issue to cover defaulted obligations and current administrative expenses.

The attitude of Japan was endorsed by the other powers and the Chinese overtures turned down pending the establishment of a government representative of all sections of the country. In the meantime, the distracted temporary cabinet, between being mobbed by unpaid employees and harassed by foreign creditors, has moved heaven and earth to raise the wherewithal to maintain itself in power. Finding all sources of foreign financial assistance closed, it turned once more to native bankers for relief. Here they also met with cold rebuffs because of the fact that the salt revenues set aside as the security for various loans advanced by the Chinese Banking group have been diverted to other purposes and, as a consequence, the native bankers who issued the railway car loan last year are unable to meet their obligations to the foreign manufactures. Typical of the methods employed to raise even a paltry hand-out was the attempt to obtain a loan secured on the Shanghai mint, an establishment as yet in the course of construction, with the machinery ordered, and delivered but still, unpaid for. Against this scheme, the American minister lodged a protest. Failing to receive financial assistance from within the country and with the mid-autumn settling day only a few weeks distant, the cabinet ministers are scurrying to escape responsibility. Unless Wu, Sun, Tsao and Chang come together without delay and sink their political differences for the welfare of the nation, China faces the prospect of being declared a bankrupt.

The initial steps to this end may be said to have been taken at a recent meeting of the consortium representatives in Peking when they telegraphed their head offices that China was without a government and completely bankrupt, unable to meet even her current administrative expenses. This verdict, we learn, was approved by the ministers of the four consortium powers.

As it is impossible to dissociate the consortium banking groups from the governments whose support enables them to exist, this decision constitutes an official recognition of China's bankruptcy, a prelude to further diplomatic action. Unless unification is brought about quickly it is difficult to see how the next crisis can be weathered.

The appointment of a debt commission to audit and supervise China's finances while the country is disunited is no solution to the problem. Such intervention would be stubbornly opposed by all the independent *tuchuns* and obstacles placed in the way of the collection of revenues. Under present conditions, the only revenues that could possibly be attached and forcibly collected by foreign creditors are the maritime customs. The collection of the salt, wine, tobacco and railway revenues against the will of the people or the opposition of any of the powerful *tuchuns* could only be assured by an army of occupation holding down the principal trade centres of China. Obviously, such drastic remedies could only be applied as the result of a close understanding on the part of all the powers and in which each would contribute its proportionate quota of troops. It is difficult to believe that any foreign government at this stage of world stress would countenance such measures unless complete anarchy in the country menaced the peace of Asia and the vital interests of neighboring powers.

The one hope of establishing a workable foreign debt commission lies in the chance that the Chinese themselves, recognizing their own impotence to pull themselves out of the hole, will invite such friendly co-operation. Here, however, we face the certainty that there is no official in Peking who dares assume this responsibility. At the present moment all the old skilfull loan negotiators have ducked out of sight, leaving the crisis to be faced by the foreign educated group of young statesmen headed by Drs. Koo, Wang and Yen. It is extremely doubtful whether any one of these able men would be willing to jeopardize their future careers by accepting international control over China's finances, even under an ultimatum of the powers. Yet the time must conceivably arrive when these conditions will be imposed by the powers in order to save China from herself.

In discussing this eventuality with various persons in Peking, their opinion was unanimous that the only Chinese political leader possessing the requisite moral courage and integrity to accept such conditions for the salvation of his country, was Dr. Sun Yat-sen. Coming from men breathing a propaganda polluted atmosphere and schooled by the claque to express admiration for Wu Pei-fu, such statements indicate a new trend of thought, a breaking away from influences which for several years past have molded foreign public opinion in the northern capital. These same people were open in their statement that the time had arrived when Dr. Sun should be given an opportunity, believing that his example of honesty would go far towards reducing corruption in the conduct of administrative affairs. It was recognized that his ascendency to power could only come through complete unification, which in itself, would render superfluous the maintenance of large armed forces by the various provinces, and do away with the incentive to further misappropriation of state funds. As president or premier of China, Dr. Sun Yat-sen might go the way of others before him, but he is entitled to an opportunity. Although unification under a military satrap might unloosen the purse strings of foreign bankers, the impression is gathered that such financial assistance would be greatly facilitated by the election of an non-military leader to the presidency.

China has survived many financial crises. At the last moment money has been forthcoming from the most unexpected sources. She may survive the next settling day and drag along until the Chinese New Year. The chances, however, are against it. Naturally, the Peking officials are circulating the over-worked argument that China's inability to meet her foreign obligations is only a

transient phase, and the inexhaustible resources of the country are ample guarantees of her stability. This optimism and faith, however, cannot offset the plain truth that these resources are as yet undeveloped and unavailable as security for outstanding obligations. There is also a natural disposition on the part of all creditor nations to live up to the spirit of the Washington treaties and give China every chance to pull herself together, but, if during this long drawn out period of rehabilitation, the leading foreign commercial firms in China are forced to the wall by reason of the inability of the Chinese government to pay its current obligations, China will receive a set back from which she will not recover for many years.

The loss of American confidence and credit incidental to a prolongation of the present situation and the hardships imposed upon American traders will deprive China of American participation in future reconstruction loans and throw the burden of financing her development upon powers who might not hesitate under given conditions to revive the sphere of influence doctrine as the only safe guarantee that their investments would be properly safeguarded.

If, therefore, China is to be saved from herself, it would seem that the time is most opportune for the American government to take the lead in proposing some remedy whereby her finances may be placed upon a solid foundation. In justice to American policies, and to our merchants and bankers who have responded to the official invitation to develop China ; in fairness to the other powers who have followed our lead and subscribed to our doctrines, and in friendly consideration for the Chinese people, President Harding and Secretary Hughes should instruct Minister Schurman to find some practical manner to apply the policies laid down by the Washington conference. Further drifting is dangerous. Unless some way can be found to save the situation and bring order out of chaos, the work of the Washington conference will go for naught. American prestige in the Far East will never survive another breakdown of our policies.

Stability and prosperity can come to China only as the result of a cessation from domestic strife. It will not come through the ascendency of any one " strong man " in the person of some super-*tuchun* with great armies to enforce his mandates, but through political unification, a coming together of all factions and the selection of some non-militarist to head the new government. No man, no matter how strong, how honest, patriotic and capable he may be, can succeed unless he represents a unified nation. That is basic. And real unification will never come to China so long as any one factional chief is financed directly or indirectly from the outside. That also is basic.

It is no longer a question of whether Wu, Chang, Sun, Tsao, Li or Chen is the best man. A stop must be put to the financing of any one faction, and the way to stop is to stop right now. If foreigners are to finance a Wu Pei-fu government over a period while he is strengthening his position to crush Chang Tso-lin, or Chang is to be assisted to re-open the issue with Wu, China will drift into a position where foreign intervention will become inevitable. It is better for the foreign powers headed by the United States, to intervene in China at the present time in a friendly and helpful manner by insisting upon unification at once rather than to drag out the agony by financing the Wu Pei-fu cabinet for another ten months and then perhaps be compelled to intervene in unfriendly manner. Prompt unification and the formation of a coalition cabinet, means prompt assistance from the financial instrument of the powers, the consortium. Any attempt to defy the powers at this time by seeking to raise outside loans, will not only defeat its purpose but create greater difficulties for China.

If we wait another ten months or a year for the parliament to draft a constitution and Wu Pei-fu to settle his score with Chang Tso-lin, the control of China will have passed out of the hands of the *tuchuns* into those of the bandit chiefs. As the mandarins gave way to the militarists, the latter will give way to the bandit leaders. Over 40,000 so-called bandits are ravaging the province of Shensi, while the provinces of Honan, Anhuei and Shantung are overrun with these gentry, to say nothing of the chronic situation in Manchuria, where the Hunghutzes defy Chang Tso-lin to suppress them. In fact, nearly every province is overrun with these bands preying upon the helpless people. Towns are burnt and sacked, women torn from their homes, and men pressed into the service of the bands. Foreigners are siezed and held for ransom, and even the son of the redoubtable Christian General Feng was kidnapped from under his father's protecting wing on a recent trip to Kueiteh. The situation in Manchuria goes from bad to worse. Within the past few months several attempts have been made to interfere with the South Manchuria Railway, and recently the rail fastenings were loosened and the express wrecked. There is a limit to such practices. The forces of Wu Pei-fu, Chang Tso-lin and other military chieftains are helpless before the bandit rule. Any serious attempt to eradicate these bands only result in their augmentation by the desertion of the uniformed troops sent to suppress them. This is ANARCHY. This is CHINA. The foreign powers can prolong the situation and make matters worse by financing any one faction, they can advance sums to Peking in order that parliament, the " salary demanders union " and hordes of officials can be sure of their pay for ten months more, but at the present rate of progress, when that time expires, the white wolves of China will rule the country. The foreigner will again be asked to furnish the funds to restore order. A vicious circle. Stop it now.

GEO. BRONSON REA.

* * *

"China's Financial Independence"

According to American dispatches, Dr. Paul S. Reinsch has accepted the post of financial adviser to the Chinese government. A Reuter's report dated Peking, September 9, gives the gist of his speech before an informal gathering of high officials at Dr. Koo's residence, the subject being "China's Financial Independence." Dr. Reinsch said :

" If Chinese financiers and bankers take the initiative in elaborating a practical policy they can undoubtedly count on international support. The present situation calls for self-help, at least in initiating a plan, as the other nations are too busy with their own affairs. A practicable proposal regarding Chinese finance would, however, receive support. Nevertheless, we must realize how near China is to a financial breakdown and what it would mean. The underlying economic condition of China is so favorable that the financial problems could be easily handled were there initiative and co-operation.

" Dr. Reinsch proposed "a Constitution interim loan" of G. $2,000,000 monthly for 10 months to give the government a chance to exist without worry during the constitution-making period. Meanwhile, a financial commission would elaborate a system of revenue reform with the co-operation of national and foreign banking representatives. Should the proposed consortium make the above loan its representatives would co-operate with the financial commission. This was the time when such assistance should be given. Later, it would be unnecessary, or too late to avert financial disaster. Such co-operation between the Chinese government, Chinese bankers and foreign financial experts would in itself restore the credit of the government. Should the consortium decline to make such a loan or propose terms which would induce a long discussion by parliament and consequent delay in the completion of the constitution it would then become necessary to invite banks outside the consortium to take up the matter.

" The taxable resources of China, when they could once be reached by new legislation after the constitution has been established, were far more ample, he said, than the resources available in any other country except the United States. What China needed was not the much-discussed "strong man" but only a good financier and team work between the Chinese government and the bankers. " China does not come before the world as pleading for assistance but as offering a plan for the development of her financial resources."

The remarkable part of the plan outlined above is the threat to invite outside banks to finance China in the event the consortium declines to advance the necessary monthly payments to tide over the government until a constitution is drafted. It should not be overlooked that the author of the above plan is the author of the consortium, the energetic statesman who formulated the Far Eastern policy of the Wilson administration, and so directed American activities in this country, that the only escape from a return to the closed sphere doctrine lay in international co-operation as the only way that American capital could hope to participate in its future development. It was Dr. Paul S. Reinsch who laid down

the rules, got the American bankers interested, induced President Wilson to reverse his policy of 1913, apologize to Wall Street and carry through the program which definitely destroyed China's financial independence.

As representative of the American government, Minister Reinsch forced through the present consortium. Now that it is adhering strictly to the rules of the game as laid down by himself. High Financial Adviser Reinsch in his rôle of a Chinese official, threatens that unless the rules are broken, outside bankers will be invited to finance China. As a Chinese official Dr. Reinsch would destroy what he committed the American government and nation to build up.

It was always a mystery why the Lee-Higginson loan of 1916 fell through. Here was an instance where an American banking group had a contract to furnish the Chinese government the sum of $25,000,000. In the final arrangements, the firm of Lee-Higginson and Company were to have been made the fiscal agents of the Chinese government, and the first installment of $5,000,000 was to have been paid over; $1,000,000 at once, and the balance within fourteen days. The $1,000,000 were paid, but the balance was never forthcoming.

In the chapter on the "Downfall of Yuan Shih-kai" in Dr. Reinsch's book ("An American Diplomat in China") he says:

"At this juncture I had to decide whether to allow the Lee-Higginson loan to be completed without a caution and warning, or to assume responsibility of virtually stopping that transaction. As soon as it became clear that open opposition to Yuan Shih-kai's government was no longer confined to one province and its immediate sphere of influence, it seemed no longer proper for any American institution to furnish money to the Chinese government. Many appeals had been made by the opposition based on the demand that, since the country was divided, no loans should be made to the government. In ordinary circumstances the protests of factions would not have weight, but when several provinces expressed their disapproval of a basic governmental policy the case was different."

The Lee-Higginson loan stopped with the advance of $1,000,000, and from the confessions of Dr. Reinsch, it would appear that his official intervention was the direct cause of its failure. We can see no difference between the situation existing in the spring of 1917 and the situation to-day. The Peking government is not representative of the country as a whole. It is the puppet of one military leader, opposed by the three eastern and several provinces in the south and southwest. A loan to Peking at this time that would enable the Wu Pei-fu cabinet to consolidate its power against the protest of other sections of China, would come under the same category as the one which Dr. Reinsch, as American minister, so effectively squashed in 1917.

The originator of the consortium fashioned an instrument which deprived China of her financial independence and then clamped and double riveted the yoke so it would stay put. It will be difficult to release China from financial dependence upon the consortium, and, if as Dr. Reinsch now advocates, outside banks are to be invited to finance the Peking government, and they succeed, why all agreements will be declared off and other independent banks will take advantage of the scramble that will be sure to follow. We will return at once to the same situation that preceded the organization of the consortium, with an open field for all.

It took over three years of the most strenuous diplomacy to perfect the present consortium and the irony of it all is that although its creators fashioned an instrument calculated to destroy Japan's financial influence in China, a turn of the wheel has given to her the right to oppose any loan to Peking before complete unification is brought about. British and American sentiment may favor a consortium loan at the present time to the Wu Pei-fu cabinet, but it is hardly probable that her partners will insist upon Japan joining them in a financial adventure which the consortium was specially designed to guard against. Japan holds the whip hand for the moment. And as there seems to be no likelihood of a break in the consortium understanding, its creator stands aghast at his own handiwork. Dr. Reinsch is placed in a most unenviable position. If his plan goes through it would mean the destruction of the consortium and a return to a free for all scramble in which the independent Japanese banks will not be far behind those who may break the deadlock. Past experience warns us that American capital will be slow to invest in China, and the urgent needs of the Peking government will again cause it to turn to Japan for financial accommodation. As long, however, as the various governments act in good faith and support their respective groups, it is difficult to see how Dr. Reinsch can break the shackles he forged and riveted upon China's financial freedom.

* * *

The Goat

On board one of the big Pacific liners two years ago, a Japanese friend came to me and said "I did'nt know that the Gaimusho (Japanese foreign office) had a goat." What do you mean by goat, I asked? Well, I have just left the smoking room where there is a spirited discussion going on about Japan and America, and someone said that Mr. So and So (a well-known diplomat) had got the Gaimusho's goat and everybody seemed to think it a huge joke. When I also laughed, he gravely insisted that it could not be true as he was certain the Gaimusho did not keep a goat. It took some time to explain the exact meaning of the word "goat" in the vernacular American, and the nice distinction of being made one and of the sport in getting the other fellow's animal. "I see," he said, "Japan has been made the goat so often in Chinese affairs that there must be quite a herd browsing around the Gaimusho's lawn." I met my friend a few weeks ago and in inviting my attention to the foreign office protest against an article in *The Times*, he remarked quite casually, "there goes another of the Gaimusho's goats."

I inclined, however, to view the matter from the other angle and see in it another attempt to make Japan the goat in China. It was not so very long ago that Mr. F. W. Stevens, the representative of the American group in the consortium, in a speech before a student's gathering in Peking, invited attention to the fact that the consortium plan was proposed by the American department of state in the summer of 1918, following or in the midst of the so-called Nishihara loans, a fact he mentioned as significant, a plan unquestionably dictated by friendliness to China." Now, the real truth behind the American invitation to the other powers to join in a new international financial combination arose from the fact that the activities of the Wilson administration had effectively closed the door to further independent American financial participation in the development of China and international co-operation became necessary in order to abolish the spheres of interest. The Nishihara loans had absolutely nothing to do with the motives underlying the formation of the new consortium, but this pretext was seized upon by its official sponsors in order to divert attention from their own blunders. Japan was made the goat in order to cover up the mistakes of the Wilson administration in China. It was either the consortium or an *exposé* of its own inefficiency, so the administration reversed its policy of 1913, and requested Wall Street to again enter the Chinese field, and behind the smoke screen of a violent anti-Japanese press campaign escaped an inquiry into its activities.

Japan became the goat of the Pacific. The pressure brought to bear upon her by the United States and Great Britain influenced her to throw overboard old policies and work in harmony with her new partners. As a result of a most bitter anti-Japanese campaign the so-called unsecured Nishihara loans were repudiated. Not a cent of interest has been paid to date, and this adventure into the Chinese financial field stands as a dead loss to the three banks which accepted the invitation of their government to advance the funds. Intervention in the internal affairs of China through the financing of the northern party, recognized by all the powers as the *defacto* government, taught Japan a costly lesson. Since then, the consortium leaders have time and again gone on record that complete unification is the first requisite to a Chinese government loan. The highest officials of the Japanese government have reiterated the

same statement for the benefit of all parties in China. In the words of Baron Ijuin of the Japanese foreign office, the advice of his government to China is to UNITE, UNITE AGAIN and keep on UNITING. Only then, after a stable government representative of the whole country has been established, could Japan demonstrate her friendship by remitting her share of the Boxer indemnity and joining with the other powers in furnishing reorganization loans to China. The policy of the consortium has been the policy of Japan.

In the meanwhile another civil war broke out in China, a conflict between Wu Pei-fu supported by British and American sentiment and Chang Tso-lin, overlord of Manchuria, the alleged tool of Japan. Wu won in the initial trial of strength and a campaign was at once started to railroad through a reorganization loan that would consolidate his power and repeat the deal of 1913 which enabled Yuan Shih-kai to solidify his despotic rule and crush the parliamentary movement headed by Sun Yat-sen. The consortium representatives at Peking were requested to advance monthly payments amounting to $2,500,000 to be secured on the estimated increase of the customs duties. Although the foreign ministers agreed that the time might be propitious for assisting the Chinese government, no definite arrangement was arrived at, and while the matter was being considered the situation in Peking rapidly changed. It soon became evident that Wu Pei-fu would be unable to consolidate his position and force unification. The Japanese minister, remembering the costly experience of his own country in attempting to bolster up any one faction in China, very wisely took the stand that any loan to the Wu Pei-fu government before complete unification would be considered by the Chinese as an unfriendly act, an unwarranted intervention in the internal affairs of their country.

We now learn from a dispatch to *The Times*, dated Peking, August 4, that the diplomatic corps had agreed to extend financial aid to China but that this was blocked by the opposition of Japan. *The Times* correspondent then indulges in day dreams and confesses that he is not in a position to know whether Japan's opposition was prompted by a desire to exercise pressure over the Shantung negotiations or whether it was due to her disinclination to see the firm establishment of a stable Peking government until the restoration to his former influence of General Chang Tso-lin. Whatever may have been her true motive, adds *The Times* correspondent, it amounts almost to a crime to deny China such assistance as to save her from her present financial straits and to help her to restore order.

We have here another picture of the playful pastime of making Japan the goat, in which the confessed speculations of a correspondent is published by one of the greatest newspapers of the world as legitimate news. It was taken for granted by the *bloc* who had been grooming Wu Pei-fu for the job of dictator, that his temporary victory signified immediate unification of China, that it was all over but the shouting. It never seemed to occur that unification might also mean recognition of the Kuomintang and its leader, Sun Yat-sen, or that even Chang Tso-lin might have a kick left in him. As matters have turned out, Sun Yat-sen is very much alive and attending to politics, while Chang from all reliable reports is reorganizing his forces to have another crack at Wu. Under the circumstances, a loan to Wu Pei-fu that would enable Peking to unite the country at the point of the bayonet, simply meant that the foreign advances would have gone the way of the Nishihara contributions to the Anfu faction. It is safe to say that very little would have been expended on actual fighting, and the time would again arrive when the Chinese would approach the foreigner for further advances in order to restore order.

If, as *The Times* correspondent asserts, "the diplomatic corps in Peking agreed to extend financial aid to China," it was surely about time that some diplomat rose to the occasion and vetoed a proposition that would only have prolonged civil war and political unrest. The attempt on the part of *The Times* correspondent to make Japan the goat for her common sense attitude, influenced the Japanese foreign office to issue the following statement on August 14 :—

"Dispatches published in *The London Times* and some other journals criticizing Japan's recent attitude towards the question of financial aid to the Chinese government have come to our notice. We wish to repeat the fact that the attitude of the Japanese government towards China is, as has on occasion been declared since the days of the last cabinet, one of non-interference in China's internal affairs, and we neither favor nor disfavor any particular party or faction in that country. To favor or support a particular influence in China would be tantamount to furthering her domestic strife. This would be most unfortunate to China, and would also work to Japan's disadvantage.

"We sincerely respect China's sovereignty, and wish for her peaceful advance and development. It is our hope that, at the earliest possible date, China will promote peace and well-being within her borders, open up her natural resources, and attain a healthy political development. If these hopes are realized and when the time is ripe for the establishment of a unified government representing the will of the people of China, the Japanese government will gladly give as much support as circumstances will permit to a government thus backed by the Chinese people as a whole. The government and people of Japan hope and believe that this happy occasion will be brought about before long by the efforts of the Chinese people themselves.

"But at the present moment, when that occasion has not yet arrived, Japan considers it most appropriate to refrain from giving financial aid to the Chinese government. The reason is: should aid be given to the central government of China while her political situation is unsettled and while that government is constantly swayed by the influence of some clique or other, it would not only be contrary to the principle of non-interference in China's internal affairs, a principle which has frequently been avowed by Japan and which has equally been observed by the either powers, but would also destroy the tendency towards better conditions which has just set in through the efforts of the Chinese people, and would thus interfere with the realization of a unified government, the result being greater chaos in China. In the opinion of the Japanese government, therefore, it is yet premature, in the light of the present political situation in China, to give financial aid to the Chinese government at this moment. This attitude of the Japanese government is in complete harmony with the purpose of the nine-power treaty and resolutions relating to China, which were adopted at the Washington conference; the opposite course of action would be an infringement upon the spirit of those international engagements. Such being the case, the Japanese government have no intention to alter their policy frequently declared in the past."

It cost Japan over $200,000,000 to express the above sentiments. If we remember rightly, *The Times* correspondent at Peking was one of those who denounced the Nishihara loans and encouraged their repudiation. It was a crime on the part of Japan to bolster up the Anfu military faction, but now that the shoe is on the other foot, and the favorite of *The Times* correspondent is on top, it is crime not to support him. Japan may have been responsible for the advantage her loans conferred upon the northern military group, but nevertheless it was recognized by all nations as the *defacto* government. In the eyes of the Wu Pei-fu claque Japan may again be guilty of a crime in opposing financial assistance to their favorite, but we feel certain that the liberal element in China, the party of Sun-Yat-sen and the adherants of Chang Tso-lin, wiil be duly grateful for this evidence of her disinterested friendship. By this one act, Japan wipes out the past. A few more "cirmes" of this nature will undo the propaganda of years and endear her to the Chinese masses. Japan has been made the goat long enough. It is time for fair play.

* * *

The Creaking of the Shantung Door

THE Japanese have no doors in their own houses. When they travel abroad and discover these facilities for ingress and egress in other people's homes, especially in China, where they are large and ponderous, they take a childish delight in swinging them back and forth, turning the knobs, fiddling with the keys, pushing the bolts in and out, inspecting the hinges and banging the old things just to see how they work. A door is a wonderful thing to a Japanese; it has so many uses. Now, if there is one thing that jars the nerves of the inhabitant of North America is the creaking, squeaking and slamming of doors. They hate to hear a door slammed. It is not done in polite society. A door can be closed gently and the key turned so as not to attract undue attention or violate the conventions. The booming of the great guns in Europe left Americans indifferent for three years, the crash of tumbling dynasties phased them not, the roar of the elevated railway and the rumbling of the subway and the strident cries of the street are as balm to the jaded senses of the New Yorker, but let some one whis-

per, "Hark! did you hear that?" "No, what is it?" "Why, it sounded like the creaking of a door over in China." Nothing annoys like the noisy noise of a closing door in China. No matter whether the Chinese are busy erecting obstructions to the free and unrestricted passage of Americans through their many angled gateways, or that other powers have quietly fenced off private preserves, yet when the Japanese makes a noise like the closing of a door, Americans at once sit up and take notice. It is not always necessary for Americans to hear the noise themselves. The confidential statement of any Chinese that the Japanese are fiddling with the hinges is sufficient to bring forth an immediate protest.

The Japanese are queer people about doors. For the past eight years they have guarded the portals to Shantung and have been very generous about conceding other nations a free passage to the trade beyond. Amongst other things they accumulated when Tsingtao surrendered in 1914, was the control over a railway, equipped throughout with German materials. Even the nails on this road bore the mark "made in Germany." One of the first things the Japanese did was to change all this. They decided that the door that had been closed to American manufacturers for so many years by the Germans, and without any loud protest on their part, should be opened to them. In fact, the Japanese said, we will make an American railway out of this little Deutsche-eisenbahn. And they did just that little thing. The locomotives and cars, the rails, machine tools and other accessories that have poured into Tsingtao the past seven years, all bore the trade-mark of some American firm. From behind the familiar American locomotive, trailed the passenger and freight cars, which if not all made in America, were built to American specifications.

Now the Japanese also build locomotives and cars. Of 3,122 locomotives in use on the Imperial Government Railways in March, 1920, over 31 per cent. were constructed by Japanese firms. The actual capacity of the various Japanese locomotive shops is about 350 locos per year. The number supplied to the Imperial Government Railways in 1920 was 170. The time had to arrive when, if these shops were to be kept going, foreign markets would have to be developed to absorb the surplus. The same with cars. As the Japanese government could not purchase its railway material requirements abroad during the war, the home manufacturers were encouraged to extend their plants in order to supply the domestic demand. In the meantime, American manufacturers were called upon to furnish the broad gauge rolling stock for the Korean, Manchuria and Shantung railways. They had a practical monopoly of this trade, and in the case of the Shantung line supplied forty-one locomotives. Now, if the Japanese had been anxious to build up a market in China for railway materials and rolling stock, it would have been an easy matter for the government to have ordered its locos and cars direct from Japanese manufacturers, at least, sufficient to have given them an entering wedge.

However, the foolish Japanese did nothing of the kind. They continued to place their orders for the Shantung Railway in the United States. Came the Washington conference and the agreement which compromised Japan to evacuate Shantung. About this time, the railway needed a few more locos and cars to take care of its growing traffic. The war boom was over and the limitation of armaments deprived the great Japanese machinery builders of their best paying work. They turned to their government for relief, and suggested that an opening be found for their products on the Japanese controlled railways in China. It is true they had never before built standard gauge rolling stock, but they could try. The Japanese government suggested to its civil administrator at Tsingtao that if an opening could be made for Japanese manufacturers in supplying the requirements of the Shantung railway, it would help the home industries over a very trying period of depression. Shortly after, an order for six locos was placed with two Japanese manufacturers, and the noise that ensued could be heard over the rumble of a crumbling China. A door had been slammed. American and British firms had been frozen out and immediate protests were made against the violation of the Hay doctrine and the Washington treaties.

In confidence, the information had been imparted to the American legation that the Chinese and Japanese delegates on the Shantung commission had entered into a secret agreement to purchase all materials for the Shantung Railway exclusively from Japanese manufacturers. Of course, such confidential disclosures of a secret agreement could only come from some of the Chinese connected with the negotiations. The American minister immediately protested against the violation of the "open door." Not that the placing of the order for six locomotives was in itself of importance, but the principle of equal opportunity had to be defended.

The Japanese simply state that as far as any secret agreement is concerned such a thing is mere piffle. They say the Chinese have followed their usual custom of setting one set of officials to watch the other, and, as in the case of the Washington conference where certain people's delegates were present to watch the official appointees, they have followed the same procedure in the Shantung negotiations. Here, they assert, are a number of so-called "Shantung Observers" attached to the Chinese delegation, representing the people of Shantung province. In order to give these unofficial delegates an official standing, the Chinese government is paying them the nominal sum of eight dollars per month. When the Chinese delegation files into the committee room, with its group of "Shantung Observers" included in the delegation, its chairman can truthfully inform the Japanese that everybody there is a "Chinese official." Dr. C. T. Wang and the other appointees of the Peking government are being watched like hawks by the Shantung representatives and as the Japanese point out, "if anything secret can be put over with this group of sleuths on the job, they would like to know about it."

On the other hand, they state that the real secret attached to the placing of the order for locomotives with Japanese manufacturers is that the Chinese had no money to pay for this new equipment and asked the Japanese to purchase the locos and accept their paper promise to pay in the future, in other words, to add it to the Japanese bill. As the railway is not yet turned over to the Chinese government, and is still under control of the Tsingtao civil administration, a bureau of the Japanese ministry of war, the Japanese government had a perfect right to place the order where it saw proper, without the invitation of tenders. They furthermore state, that in addition to the six locomotives whose purchase was agreed to by the Chinese, an order for forty cars has been placed in the same manner. These cars will not be delivered until next year, when the line will have been turned over to the Chinese, but again, the latter said they had no cash to pay for this material, and as the railway required the cars, they requested the Japanese to supply them and accept their I.O.U. That is all there is to the story, say the Japanese. They furthermore invite attention to the fact that if they are to be paid for the Shantung Railway in five year bonds or longer, they are entitled to impose the same terms and conditions as obtain in all other Chinese railway loan agreements, viz, that preference shall be given to Japanese materials during the life of the loan.

If the confidential information furnished the American authorities at Peking is correct, then Minister Schurman did the proper thing in promptly protesting against the closing of the door to American manufacturers to equal opportunity in the supply of materials to the Shantung Railway. If, however, he was misinformed as the Japanese insist that he was, the incident simply revealed how nervous Americans may become when someone tells them a door is creaking somewhere in China.

The question is bound to arise sooner or later, whether China as a sovereign state, is not at liberty to place her orders for materials where she wills, with or without tenders that admit manufacturers of all nations to equal opportunity. As long as the Shantung railway remains under exclusive Japanese control, it would seem that her officials have the right to favor their own manufacturers without other powers protesting against a violation of the "open door." When the line is turned over to China, it would also seem

that the same fundamental rule would hold good. The original conception of the Hay doctrine was to save China from the spheres of special interest, in which American trade might be barred out by discriminatory laws and duties. The modern conception of the open door would seem to prohibit the Chinese government from exercising its undoubted right to purchase materials without submitting the tenders to international competition. In the case of the Shanghai mint, where this sovereign right was exercised and the machinery ordered from America without the British being permitted on opportunity to compete, there was no invocation on their part of the violation of the "open door" principle. In that instance, it was gross partiality, and unfair methods that were complained of.

Secret agreements are one thing and should be discouraged, but the right of China or Japan to exercise their undoubted prerogative in purchasing materials at their own discretion is another thing.

* * *

An Engineer Educator

THE time is rapidly approaching when Americans must revise their ideas about the education of Chinese and determine whether it is best to contribute large sums to continue their

Charles K. Edmunds, Ph.D.

President, Canton Christian College, since 1907
Professor of Physics, 1903 to 1907

Observer in Charge, Magnetic Survey of China
Carnegie Institution of Washington, 1905-1917

training in the United States where they absorb ideals difficult to live up to or put into practice on their return to China, or whether these young men are to be trained in their own country.

When Washington made his will he put into it a provision that there should be set aside a certain sum of money in order that Americans might be educated in the early constructive days of the republic under the influence of American institutions rather than have their young training under the royalistic influences of Europe. In like manner, China needs, in the young formative college years, institutions on the soil of China where men are trained to understand the problems of China, to think as Chinese and to talk as Chinese, to dress as Chinese, and to develop as Chinese. We cannot Americanize China. China should be assisted to develop as China, for in that way she will contribute most to the civilization of the world.

Along these lines the Canton Christian college, with a half-dozen like it, is working in a strong, modern, scientific way for a solution of one of the world's greatest outstanding problems, doing for China what must be done if Asia is to fulfil her part as a cog in the great wheel of modern co-operative progress.

At this head of this successful institution is Dr. Charles K. Edmunds, an American engineer and educator, who left home twenty years ago to bring to China the best of our civilization. At a recent testimonial dinner given in honor at Delmonico's in New York, Dr. Edmunds brought forcibly before his audience the necessity of educating the Chinese in China, for China.

"The reorganization of China by Chinese aided by foreigners actuated by friendly and not predatory motives, the introduction of foreign capital and the internationalization of foreign interests in a cooperative spirit with China constitute the only hope as regards China's foreign relations and even as regards her internal development.

"That China greatly needs energetic, resourceful and unselfish leaders is apparent from a mere glance at the gamut of problems which she faces, political, economic, social, physical, industrial and educational, many of which demand immediate solution or at least immediate attack. These leaders should receive the bulk of their training in China, for they need to know their own land as well as western science, institutions and methods.

"Then, too, the common people must be educated to form the background of general enlightenment and the foundation of progress. China's educational problem is enormous. A population of 400,000,000 requires for an adequate public school system not less than 2,000,000 teachers for all grades. It will require at least another generation to develop such an educational army.

"In attempting to establish a republic before the people, by education, are prepared for it, and to establish public schools before the government is sufficiently stable to finance them, China has undertaken the greatest educational problem of all time.

"Mere education in the science of the west, mere contact with western civilization, commerce, railways, telegraphs, mines, etc., cannot be expected to regenerate China, for the Chinese seem never to have been profoundly moved by other than moral and spiritual forces.

"Progressive currents are at work in China, and when you consider the size of the country and her lack of communications, her lack of money, and the character of the treaties imposed upon her by foreign powers, it becomes clear that while China is not entirely free from faults, her present condition is not entirely the result of her own actions or defects, but has been partly imposed by unfair actions of other powers. I am convinced that if all concerned would observe the policy of "Hands off China except to help," the Chinese would in due time solve their own problems. But we must allow China the same measure of time which we ourselves required to solve the problems of state rights *versus* federal control. The so-called chaotic condition of China and her backwardness are over-emphasized. From intimate knowledge of conditions I venture to assert that economically and commercially China is probably to-day more normal than any other large nation, and in spite of the political differences which exist she is to-day more homogeneous even politically than any equal aggregate population anywhere else in the world.

"The spirit or genius of the Chinese people very closely resembles that of the typical American, and it behooves us to realize that not only will a closer co-operation between our two nations be of benefit to China, but in a very real way it involves also the future prosperity of our own land and the peace of the world."

Here speaks the true American leader in China. China must solve her own problems from within, and to do this her sons must be educated in China where they will understand their own problems and be able to take an active part in their national affairs as soon as they have completed their education.

Days of the Compradore are Numbered

By O. D. Rasmussen

SIGNS are not wanting in post-slump readjustments in this country of a gradual revision of ideas in the value of compradores to foreign trading organizations in China. Not only have many firms begun to doubt if the compradore is worth the large commission he takes, but in several cases they have begun to operate without him.

For over a hundred years the compradore has been the connecting link between foreign firms and Chinese dealers. His middleman services were at first a political expedient, rendered obligatory by restrictions placed upon foreign traders at Canton, where the East India Company and others were confined to a limited area, outside which their nationals were not permitted to go.

As with other customs in China, once established the compradore system became a permanent idea in the minds of both foreign traders and Chinese dealers. The system passed from a political to a commercial necessity. Foreign firms were content, with large marginal profits, to be relieved of the burdens incident to marketing and buying in a difficult language, while the Chinese dealers were glad, for similar reasons, to trade with men who dealt with them according to their ways and in their own tongue.

Thus, unfortunately, foreign firms placed themselves in the hands of a group of non-producing middlemen, upon whose cupidity and whimsicalities has depended practically the entire foreign trade of China since contact was properly established over a century ago. It was unfortunate because foreign firms neglected the essentials of commerce by allowing themselves to remain in ignorance of the language and without personal contact with the people with whom they came to do business.

The compradore system, it must be conceded, was not without its facilities. It would not have lasted so long had it been otherwise. But great as those facilities have been, they constituted in themselves, an obstacle to the proper development of trade relationships. Many foreign firms have been financed by compradore capital and tided over difficult periods by the same financial source. Moreover, the compradore was a guarantee of the commercial integrity of Chinese dealers and, with his organization of market shroffs and other intelligence, able to keep more or less in reliable touch with markets inaccessable to foreigners, ignorant of the language.

Had the compradores always acted with conscientious regard for the welfare of foreign business and the commercial development of their country they might have fully justified themselves and consolidated their position. But they have not. They have fallen down in many big and little things that prove their inefficiency and lack of dependability, especially when confronted with crises such as that through which business has recently passed.

To begin with they never educated themselves to the degree necessary to keep abreast of changes in their own country. They were, in numerous cases, ignorant of their own language and customs, witness the many stupid Chinese translations of foreign names, given by compradores to, and accepted in good faith by, foreign firms. They have permitted foreign firms to market goods under trade-marks and illustrations that have been offensive to their own people and which have resulted in failures, in connection with certain goods, which should have, with different marks, found ready markets.

When the piece-goods and woollen goods exchange debacle smothered the entire economic structure in 1920, and Chinese dealers repudiated their obligations and in many cases fled from the jurisdiction of treaty ports, the reputed guarantees of compradores fell sadly to the ground. Their mythical guarantee was no stronger than the dealer himself. In fact, in many cases, the compradores took up a position on the side of the dealers against the foreign firms. They backed the dealers, in spite of the latters' own responsibility for not booking exchange contracts to meet their engagements.

In connection with the same trouble, the compradores introduced and permitted Chinese dealers, upon no security whatsoever, to make contracts with foreign firms for piece and woollen goods, to an amount far beyond their ability to finance. Almost any office boy in a long gown, attracted by the profits of a 9/- tael, could enter orders for piece-goods. Consequently, with the cupidity and business acumen of an office boy these whip-poor-will dealers, gambling on the chance of getting a 12/- tael, found themselves overnight, facing gigantic losses on a tael that slumped to 6/-.

It is true that some inexperienced foreign firms, mostly American, dealt independently of compradores, but the large majority were dependent upon their middlemen for the integrity and financial security of dealers.

However, it is sufficient to prove the failure of the compradore system, when it is considered that with or without compradores, foreign firms were forced to the wall in the crisis.

If there are apologists who find extenuating circumstances in an extraordinary state of affairs such as the 1920 exchange slump represents, they would be hard pressed to find further apology for the combinations in restraint of trade practised by compradores during the period immediately preceding and following that crisis.

In North China, as an example, sheep's wool that in previous years was bought from dealers for 15 taels a picul, was gradually forced up by compradores to 45 taels. In constant touch with the home war demand as reflected by the purchases made by foreign firms in the wool market, the compradores pushed the price up by common consent. Costs of production in the interior never ascended one cent. The wool grower at inland points got very little more for his product than before, although the fiction that it was he who forced the abnormal prices was widely circulated.

By reason of "inside information," readily on tap through the medium of the foreign firms' Chinese office staff, who handled invoices, shipping documents and incidental data, the compradore kept intimate track of just how much profit the firms were making, and used it as a guide for his own quotations. To illustrate how subtle the compradore ring worked, this wool for a while remained at 35 taels a picul, when one foreign firm, anxious to get a big shipment away, offered 37 taels in order to corner as much of the product as possible. The next day firms asking their compradores for quotations received them at 37.

In many other commodities the same practice in restraint of trade was evidenced. Straw-braid, hides, egg products and other of those which found great demand during the war were forced sky high by the compradore ring. A personal interview with several of the leading men, when foreign markets stopped buying, evoked the statement that they would, under no circumstances, bring their prices back to normal. They said they would refuse to sell for two years or more, if necessary, to hold up the prices. They did hold out for a long time, but not two years. The 45 tael wool is now back at 15 and less.

There are firms in China, which broke away from the compradore ring many years ago and have not regretted it. There are firms which have only recently cut out middleman trading and they also do not regret their step. Aided by the facilities initiated by chambers of commerce, whereby instruction in Chinese language is given to employees by competent teachers, traders are gradually beginning to organize staffs capable of placing them in direct personal contact with Chinese markets.

Here and there in the foreign trade group firms are reported to be working independently of compradores. The breaks are becoming more frequent and firms have an increasingly large representation at inland points where the raw products of China are marketed.

China's foreign trade stands to benefit greatly by the change, for not only will foreigners obtain a more satisfactory and closer business connection, but also they will be able to export and import cargo without the unnecessary taxation of ten or more per cent. profits of the compradore, who has long ago outlived his usefulness, such as it was, and whose halcyon days in the business of China were considered long ago to be numbered.

The Kochiu Tin Mines

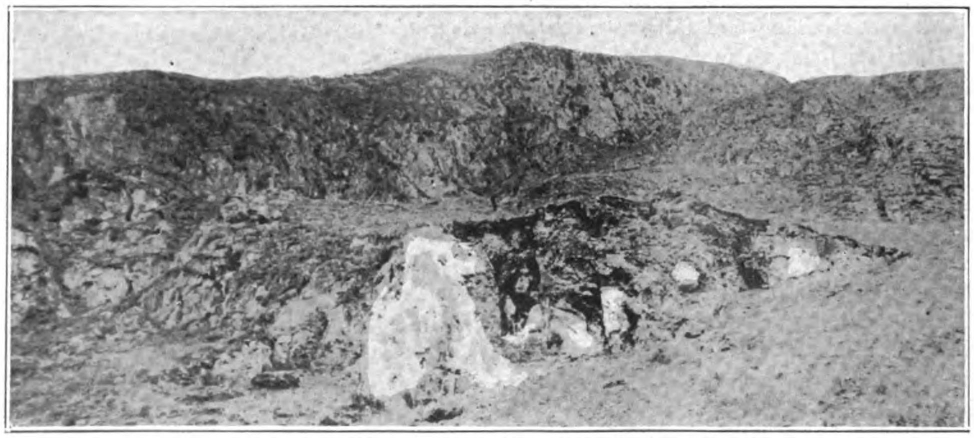
KOCHIU, a city of about 130,000 inhabitants located in the southwest corner of the province of Yunnan, is the centre of China's tin mining industry. It is reached by the Yunnan Railway from Indo-China, the traveler alighting at Mengtsze and proceeding by chair or pony across the mountains to the tin fields, located for the greater part near the tops of the mountain ranges enclosing the valley of Kochiu. The largest of these mines, ten miles east of Kochiu, is the Ma La Ko, then comes the Huang Mao San and about 100 others of varying extent and outputs. Not long ago the well-known firm of Shewan, Tomes & Company installed a pumping plant to furnish one of the larger mines with water. Their engineer, Mr. William Semple, on his return to England, read a most interesting paper on the "Kochiu Tin District" before the institute of marine engineers, from which the following up-to-date data is abstracted. Mr. Semple says:

General View of Kochiu City, Yunnan province, the centre of the largest tin mining industry in China

"It is difficult to get any information as to when the tin mining really started, as no authentic records seem to have been kept, and the only data I could find were on a tablet in one of the temples, which gives the date as about 400 years ago. All the mines are situated on the tops of high mountains or in the gulches between them. From my own observation I find that alluvial mining was carried on extensively in the earlier years, the ore being plentiful and easy to get at. It is said by some of the old miners here that when mining was first started it was to obtain silver, and during prospecting the great tin ore beds were discovered, and the abundance of tin ore in this district is really remarkable. Although alluvial mining was carried on extensively the miners opened tunnels in order to search for a finer grade ore, and some of these extend into the mountains from 2,000 to 4,000-ft. from 3,000 to 10,000 men being employed. The largest mining firm here is the Yunnan Tin Trading Co., who are at present introducing a large pumping plant, the installation of which was the reason of my visit, to enable them to work the whole year round and supply sufficient water for ground sluicing on their open mines at Malaga Hill. The ore is earth ore, and when it comes out of the mines it is usually crushed by native methods, either by hardwood clubs or a stone crusher driven by water-buffaloes, then it is all hand-washed, the ore receiving about forty washings before it is smelted. The native furnaces are very interesting; they are built with mud bricks and have a little over a ton capacity. The air-blower, supplying air to the furnace, is native made; the barrel consists of a large piece of timber hollowed out and fitted with a piston, the air suction valves being of buffalo hide and the air discharge going direct into the bottom of the furnace. The whole apparatus is worked by manual labor, and it takes from eight to ten hours to make a cast; the smelted tin is run into sand moulds; the metal obtained runs from 92 to 99 per cent.

"The Yunnan Tin Trading Co. have a large up-to-date smelting and concentrating plant, which was built by the Germans about ten years ago, and run by their own men. On the outbreak of war the Chinese took it over, and have never used it until quite recently, when they put it under an American administration, and when working fully it will handle 1,000 tons of ore a day.

"The lay-out of the plant is very similar to other mining plants—that is, when the ore is brought down from the mines it is taken by elevator to the top floor, where it enters the large ball mill, and is there crushed to a 16-mesh, afterwards going to a secondary crusher, where it is graded down to 100-mesh; from there it flows down shutes to jig concentrators, where it receives its first washing; from there it flows down to the Wilfley shaking tables below, where it is further washed and graded, the tailings passing out to ponds for re-treatment later on. As regards the percentage of tin obtained from the ore, there was some doubt raised as to being able to make standard tin from the ore obtained at Malaga; the result was that the company brought out an expert metallurgist from America, who spent over three months sampling and assaying the ore, and he got some of the most marvelous results I ever saw. He showed me a sample he had taken from a large cast of tin bars he had made, and after



One of the Tin Mines located about 10 miles from Kochiu

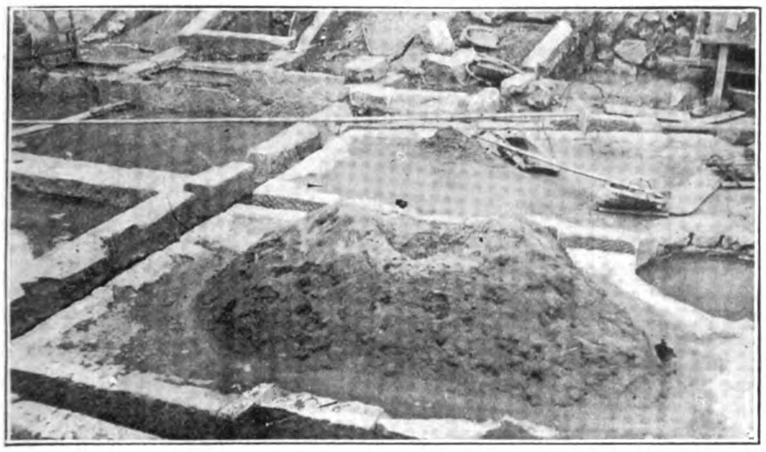
VIEWS IN THE KOCHIU TIN DISTRICT

Tin Ore Waiting for the first Washing

Tin Ore Washing Troughs

Washing Tin Ore in the Compound of the Kochiu Tin Trading Co.

Washing Tin Ore



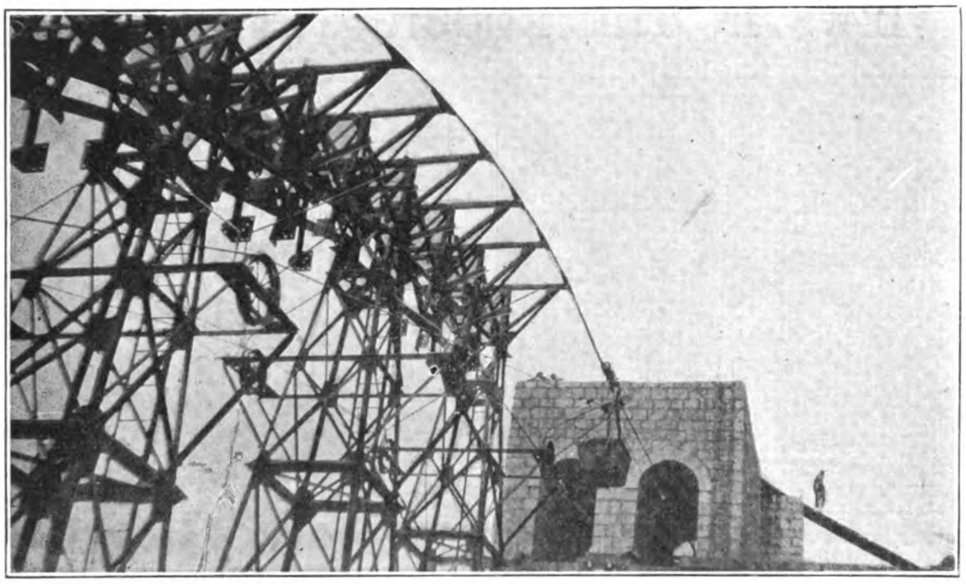
Washed Ore ready for the Smelter

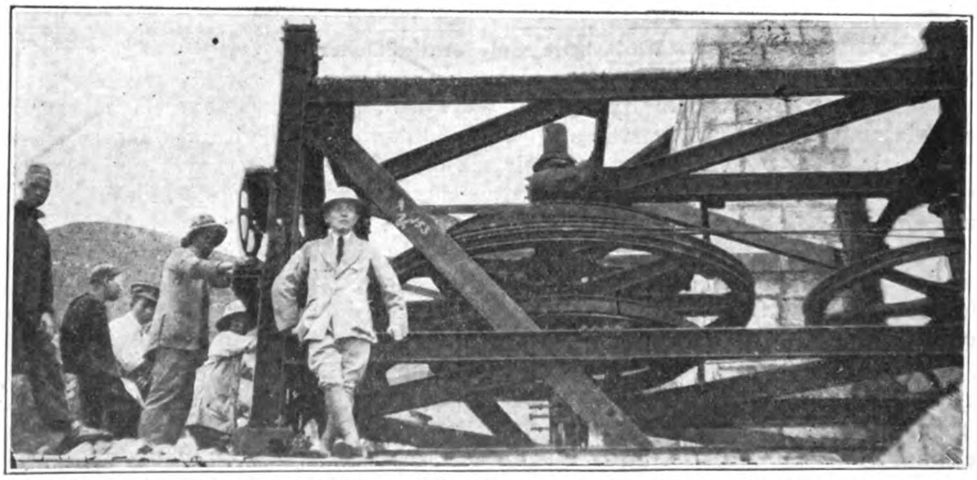
assaying them showed the high purity of 99 per cent., and he proved that standard tin could be made from these ores. He made out a complete set of plans for a new lay-out of their smelting and refining plant, which I understand they are going to put in next year. The smelting furnaces at present are on the Siemens-Martin principle, six in number, of ten tons capacity each, one gas generator supplying two furnaces. At present they only run two furnaces, averaging about two casts a day. The native furnaces are of the beehive pattern, and built of mud bricks and average two tons capacity, wood charcoal being used as fuel and the air blast hand-driven. These furnaces work very well, being easy to build and keep in repair.

"The conditions at the mines for boys and men are practically the same, and ventilation most inadequate, being absolutely devoid of fans. Whether there are any mining laws relative to this province I don't know; there must be, as there is a director of mines in Yunnanfu, but I have never seen them, the native methods of mining being used for centuries. However, the administration has all been changed this last year for the better, as many Chinese are educated in American mining colleges, and are quite used to the existing conditions. I understand they contemplate sinking a shaft 1,000-ft. deep to connect into the present mine tunnels at different levels, and also putting in a proper ventilating shaft with fans; also rebuilding all the housing quarters with well-equipped hospitals and medical attendance, which is much lacking at present. When these alterations are carried out it will be ideal for the miners, as they will then be able to work regular hours, and all the ore will be hoisted to the surface in mine cars and dumped into bins. At present, what

causes the high mortality among the miners is coming out of these hot channels dripping with sweat, carrying their loads of ore, and being very thinly clad the cold air simply catches them, and they develop lung trouble, which, if not checked in time, turns into tuberculosis, and once they get that they only last about a week. They have no set hours of work at present; just simply so many loads of ore to bring up, the average being five; over and above that they get a bonus of 10 cents a load. These loads for the men average 133-lbs., and for boys about half that, or according to their strength. So you can imagine what that means coming out of a tunnel 4-ft. square and 2,000-ft. long, the floor having an incline of 45 degs. and the ore dump about half a mile from the mouth of the tunnel. As far as I understand their wages average from 50 cents to $2 a day, according to their time of service. All the miners are well fed, but that does not compensate for the hard conditions they live under at present.

"The greatest trouble they have is in the refining of the tin, due to the percentage of lead and arsenic being high. Formerly it used to be shipped to Hongkong, and re-melted and refined before being put on the market, thus adding unduly to the cost. To overcome the difficulty they have engaged an American mining engineer, as well as a smelting specialist, to give attention to all the work near the mines and bring the tin up to the required standards to compete in the open markets of the world. Whether they will [introduce modern methods of mining remains to be seen. I doubt very much if it would pay owing to the large overhead expenses in bringing machinery up the mountain, transportation being a very difficult and dangerous problem judging from my own experience in bringing the pumping machinery across. The cost of transportation alone was $40,000. This gives an idea of the very wide margin of costs firms have to work upon when doing business in this province. But when once the Chinese wake up to that fact with the possibilities of development, and put down good roads and make the interior safe for foreigners to live in (although they will certainly need foreign help to develop their resources and make conditions good generally all round), then the future of this province will become very bright."





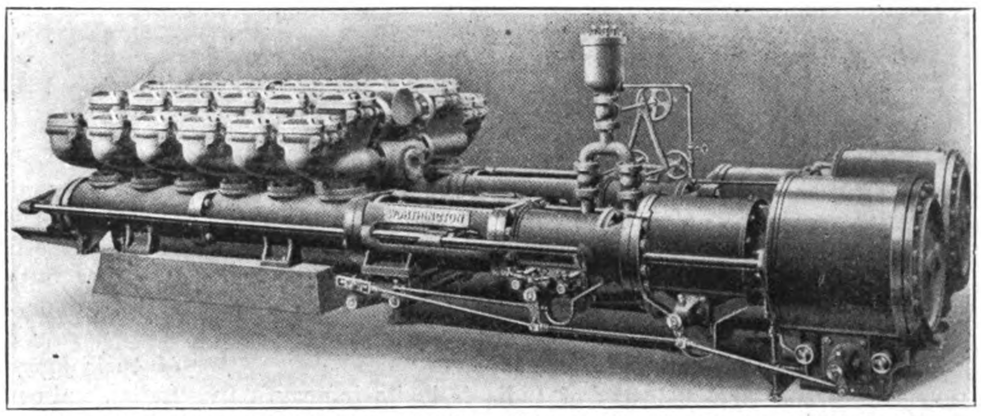
Three Views of the Cable Transmission Line conveying Tin Ore from the Mines to the Smelter

The smelter above referred to, operated by the Yunnan Tin Trading Company was founded shortly before the outbreak of the Chinese revolution in 1911. It is an official provincial enterprise under the direction of the finance bureau of the Yunnan government and like all Chinese official concerns has had its share of financial troubles during the past ten years. At one time it attempted to relieve the financial pressure on the provincial government by issuing its own bank notes, but in face of severe opposition was compelled to withdraw the issue. As the official company also works the rich Ma La Ke Mines it has managed to clear a fair profit and devote considerable funds to the betterment of its properties. One of these improvements, cutting down the excessive costs of transportation was the installation of an aerial conveyor to carry the ores from the mines to the smelter, and the pumping plant referred to by Mr. Semple, which is located at the foot of Lao Tu-shan. The plant consists of two triple-expansion Worthington pumps designed especially for this work by Mr. E. G. Norman, their engineer for China, and sold through Shewan, Tomes & Company. These pumps have a capacity of 7,000 tons of water per 24 hours delivered against a head of 3,000 feet. The water is taken from a reservoir of 3,000 cubic metres capacity fed by a small canal 23 miles long which carries the water from the Cha-tien river.

In addition to the larger smelter there are a number of the native variety, which produce an aggregate of 10 to 15,000,000 kilos annually, of which, the official smelter turns out

about 998,400 kilos. The highest output of the big smelter was 1,664,000 kilos. There are about thirty of the native smelters in the Kochiu region, which operate for only about four months in a year.

The construction of the smelters is very simple; the bricks being obtainable on the spot, they are not very costly to build. The blast is supplied by a wooden air-pump with piston packed with feathers, the usual instrument for providing blast in old Chinese forges and furnaces. Each furnace is run by ten men (five per shift) and a foreman.



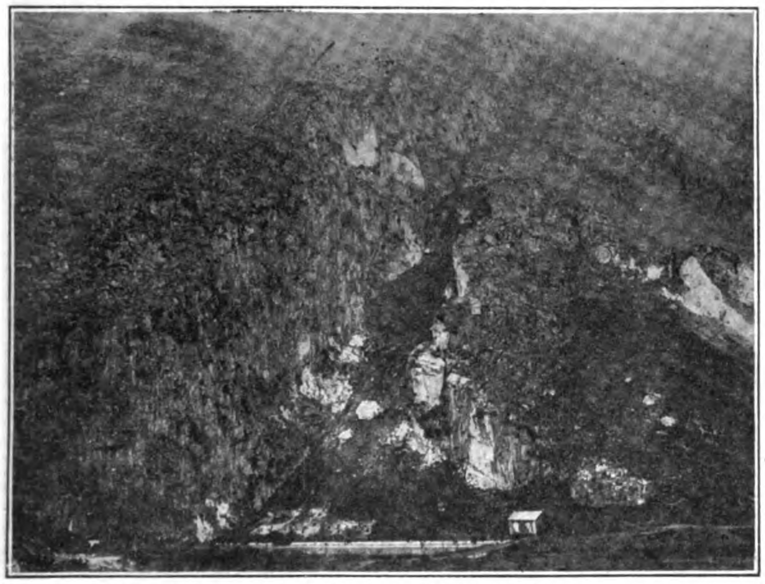
Type of Worthington Triple Expansion Mine Pressure Pumping Engine, installed at the Reservoir, delivering 7,000 tons of water per 24 hours against a head of 3,000 feet

Six-hour shifts are customary. Three men work at the blower, one man sees that the metal runs well from the tap-hole. One man is engaged in feeding the ore and charcoal. In addition to these, there are two men engaged in pouring the metal. The slags from the furnaces are crushed and washed to extract the matallics. The remainder is re-smelted with ore until considered free from tin. It is then dumped as conveniently as possible anywhere in the town.

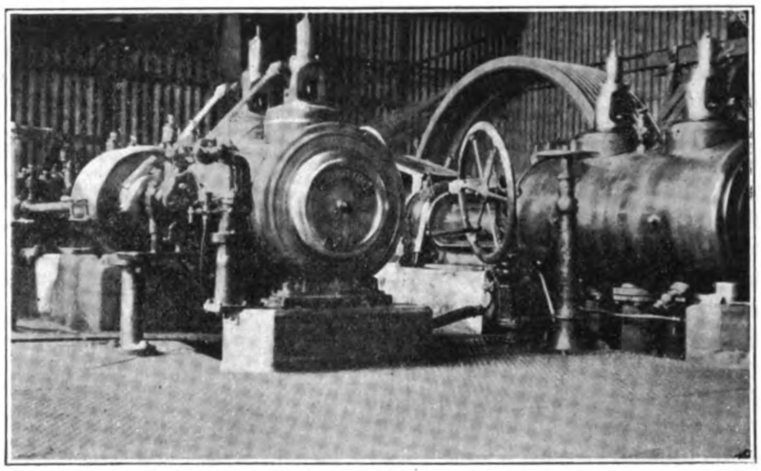
There is no attempt at refining the metal at Kochiu. The chief impurities are iron, often present to the extent of 1 per cent. and lead, usually less than a quarter of 1 per cent., though the metal from some of the mines may contain over 50 per cent. of lead.

Each slab, before leaving Kochiu, has to receive official " chops " or marks showing the slab has been weighed, and that the requisite taxes have been paid on it. When the slabs reach commerce, they usually also have been marked with the name of the furnace in which they were smelted, the merchant to whom they belong, and the transit agent through whose hands they have passed.

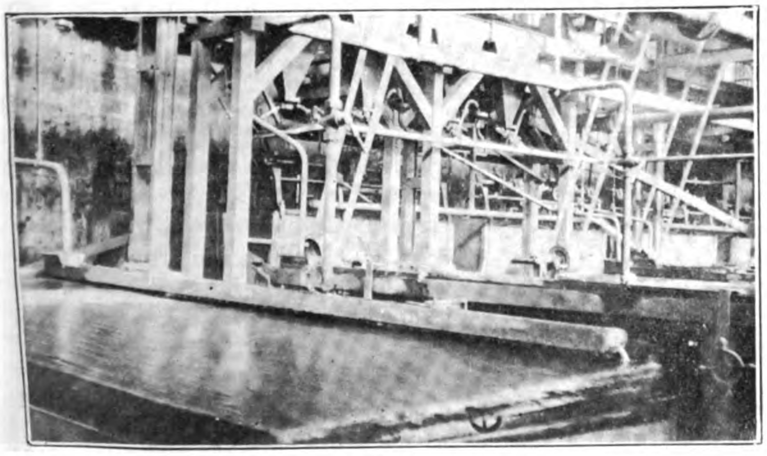
The miners pay no direct taxes to the government. A small local tax is sometimes laid upon concentrates for the upkeep of the roads.



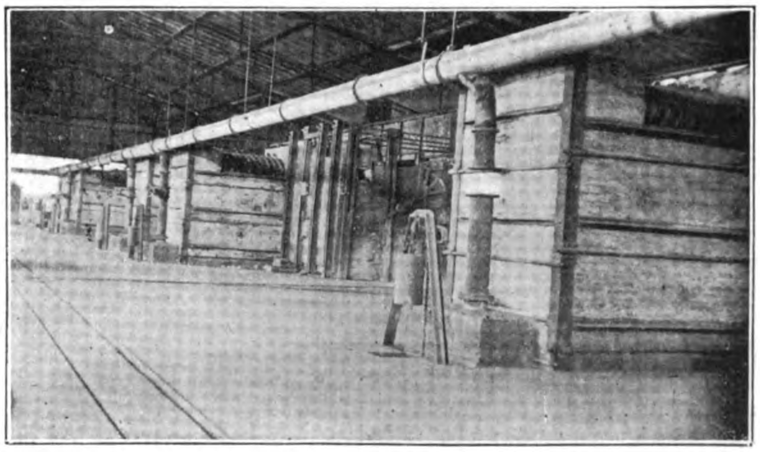
Site of Pumping Station to Supply the Ma Lake Mines, located over the top of the Mountain, 3,000 feet above the Reservoir



German Power Plant at the Kochiu Smelter



Ore Washing Plant



Siemens-Martin Tin Smelters

Iron and Steel in India

WITH the permission of the director of the geological survey of India, Mr. Cyril Fox, B. SC., M.I.M.E., F.G.S., an officer of that department, has contributed to the *Mining Journal* of London an article on "The Trend of the Mineral Industry of India." An advance copy of the article is published in *The Indian Trade Journal*, from which we extract the following notes on iron and steel production :—

The iron and steel industry of India is in its infancy. In view of the developments that are taking place, and from a knowledge of the vast deposits of high-grade hematite in the belt of country from Mayurbhanj state westward to the states of Keonjhir and Bonai and the Kolhan sub-division of Singhbhum, this industry must eventually become of very great importance to India. Although much has been written of the Bihar and Orissa iron ores, it is, perhaps, not fully realized how immense are the quantities of available high-grade ore. Both the quality and quantity of hematite in this part of India are calculated to exceed the great American deposits of the Lake Superior region in Minnesota, Wisconsin and Michigan.

Although there are, at present, only two large iron works which are producing iron and steel in India, a third is rapidly being erected and others are projected.

TATA IRON AND STEEL.—Of the existing companies (1) the Tata Iron and Steel Works are established at Jamshedpur, in Singhbhum (B. & O.), a few miles north of Tatanagar, on the main B. N. Ry. line to Bombay. Originally, this company relied on the iron ores of Gurumashisni (Mayurbhauj state), but the neighboring deposits of Okampad and Badanpahar are being opened up. They obtain their limestone from Gangpur state, where there are two occurrences, near Panposh and Bisra. Although the quality of this flux is very good, the material is not cheaply obtained. The rock is not quarried, but mined, and, as may be imagined, the limestone question has not yet been satisfactorily solved. Their coke is made from Jherria coal. The production of these works has been (1919-20 exports from Jamshedpur) 50,000 tons pig iron, 75,000 tons of steel rails, and 60,000 tons of bars and girders, valued in all at 5 crores of rupees. Two more blast furnaces capable of producing 1,000 tons of pig iron a day, a new duplex steel plant capable of an outturn of 1,000 tons of ingots a day, and mills for plate, sheet, bars and rail and structural work, have been erected, and are practically ready for blowing-in and working.

To utilize the finished iron and steel products of their mills a number of subsidiary companies are being established at Jamshedpur : The Calcutta Monifieth Works, for the manufacture of machinery for the jute industry; the Enamelled Ironware, Ltd., for the manufacture of domestic utensils and other types of goods; the Tinplate Company of India; the Agricultural Implements Co., the Indian Steel Wire Products, Ltd.; the Enfield Cables Co.; and the Hume Pipe and Construction Co.

(2) THE BENGAL IRON CO., LTD. have their headquarters at Kulti on the Bengal side of the Barakar river. They obtain their iron ores from north-west Kolhan (a subdivision of Singhbhum) and Keonjhir state. The coke is made from Jherria coal and from the company's collieries at Ramnagar, near the works. Most of their limestone comes from Sutna (Rewa state, in central India), and partly from Bisra. They produce daily about 450 tons of pig iron, but utilize most of this in making castings of special types, chiefly railway sleepers and chairs. It is not clear when this company propose to re-establish their output of ferro-manganese.

(3) THE INDIAN IRON AND STEEL CO. are erecting works at Hirapur, on the railway between Asansol and Adra in Bengal. They will be supplied with iron ore from Gua in Kolhan, along the new railway extension, which leaves the main B. N. Ry. line at Amda and passes through Chaibassa to Jamda. The flux (limestone) is obtained from Gangpur state, and the coke is to be made from the coal of the local fields. At first the company will restrict itself to the production of pig iron, the present plant being designed for a daily output of 600 tons.

In addition to these there are a number of new companies.

(4) THE UNITED STEEL CORPORATION OF ASIA, LTD., was registered in India in December, 1921 with a capital of £10,000,000, at 6½ per cent., by Messrs. Bird & Co., of Calcutta, and Messrs.

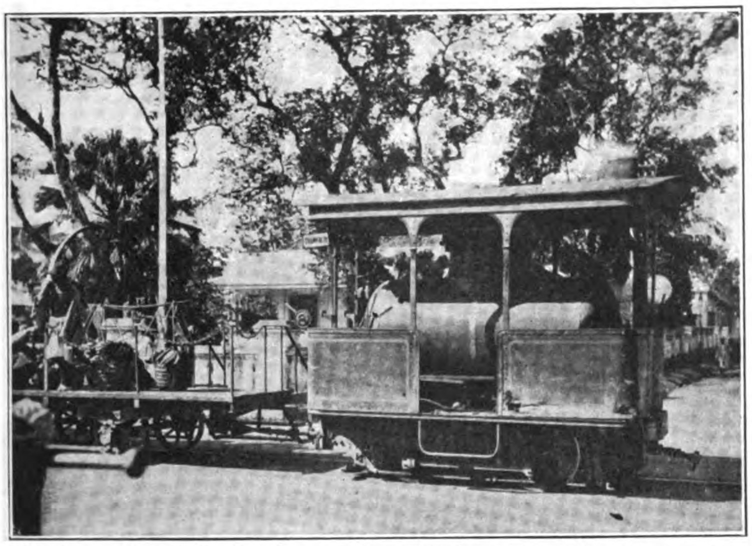
(*Continued on page 579*)

(*Mining Magazine*)

N. E. I. Railway Electrification

ALTHOUGH the plan for the electrification of the Java State Railways main line from Batavia to Sourabaya has been temporarily abandoned on account of financial depression, the project for the electrification of 50 miles of inter-urban lines in the vicinity of Batavia is rapidly nearing completion. An appropriation of 5,000,000 guilders is in the hands of the electrification department of the state railways, who, in connection with the department of waterpower and electricity, have outlined a three years' program.

According to Dr. G. de Gelder, head of the electrification department, the first of the new electric lines will be in operation next year. Although only a stretch of ten miles, connecting Tandjong Priok, the harbor of Batavia, with Meester Cornelis, one of the principal residential districts of the vicinity, the use of electric power will mean not only a great saving in fuel expenses, but an enormous saving of time for the commuters of the capital city. The European population of Batavia lives either in Meester Cornelis or Weltevreden, and are forced to make the daily trip to their business houses in Bataviaor Tandjong Priok by railway or steam tram. The present time for a trip from Priok to Cornelis one hour and a half. The electric cars will make the trip, including stops, in 24 minutes. Ten minute service will be given at first, with five-minute service to be offered if the traffic warrants it. The whole length will be double-tracked.



"Hohenzollern" Fireless Locomotive which now furnishes the motive power for the greater part of Batavia's inter-urban service. The locomotive is charged with super-heated steam at the power-house in Kramat, and under ordinary conditions will make the round-trip without difficulty. In case of a cold thunder-shower, or a traffic jam, causing the journey to occupy more than an hour and a half, the steam gives out and the stalled engine has to be rescued by the next one along.

The two other sections of the electrification plan, to be completed in 1924 and 1925, include lines from Tandjong Priok to Batavia, and from Batavia to Weltevreden, Manggarai, and Meester Cornelis. The entire system will be double-tracked, standard gauge.

The source of power will be hydraulic. The department of waterpower and electricity, which has surveyed the entire island for hydro-electric stations to be built as the electrification scheme materializes, has completed a plant at Tji Badak near Soekaboemi, for the inter-urban lines. The power be carried the 70 miles to Batavia at 70,000 volts, three-phase high-tension current. Two sub-stations at Meester Cornelis and Antjol, will transform it into 1,500 volts D.C.

Bids for cars, which will be of the overhead pantograph type, have been received from Dutch, German, Swedish, Swiss, British, and American firms. Although the awarding of contracts has been practically decided, confirmation must be received from Amsterdam before the awards are published.

"I can say unofficially," said Dr. de Gelder, "that a large share of the work will fall to American bidders. German bids were low, as was unexpected, but we were greatly surprised at the low figures quoted by American establishments."

The first order will include 20 motor units of two cars each, a number of electric locomotives not yet decided, and equipment for the sub-stations.

As soon as funds are available, work will be begun on the electrification of the mountain lines of Batavia and Preanger provinces. The need for electric service from Batavia to Buitenzorg and Bandoeng has been declared "urgent" by Dr. de Gelder, not only through the necessity for faster service, but because of the large amounts of fuel burned by the steam locomotives of the mountain lines.

The larger electrification projects have been laid aside until more prosperous times, although northern Celebes is being surveyed for possible electric lines in Minahassa.

Iron and Steel in India

(*Continued from page 578*)

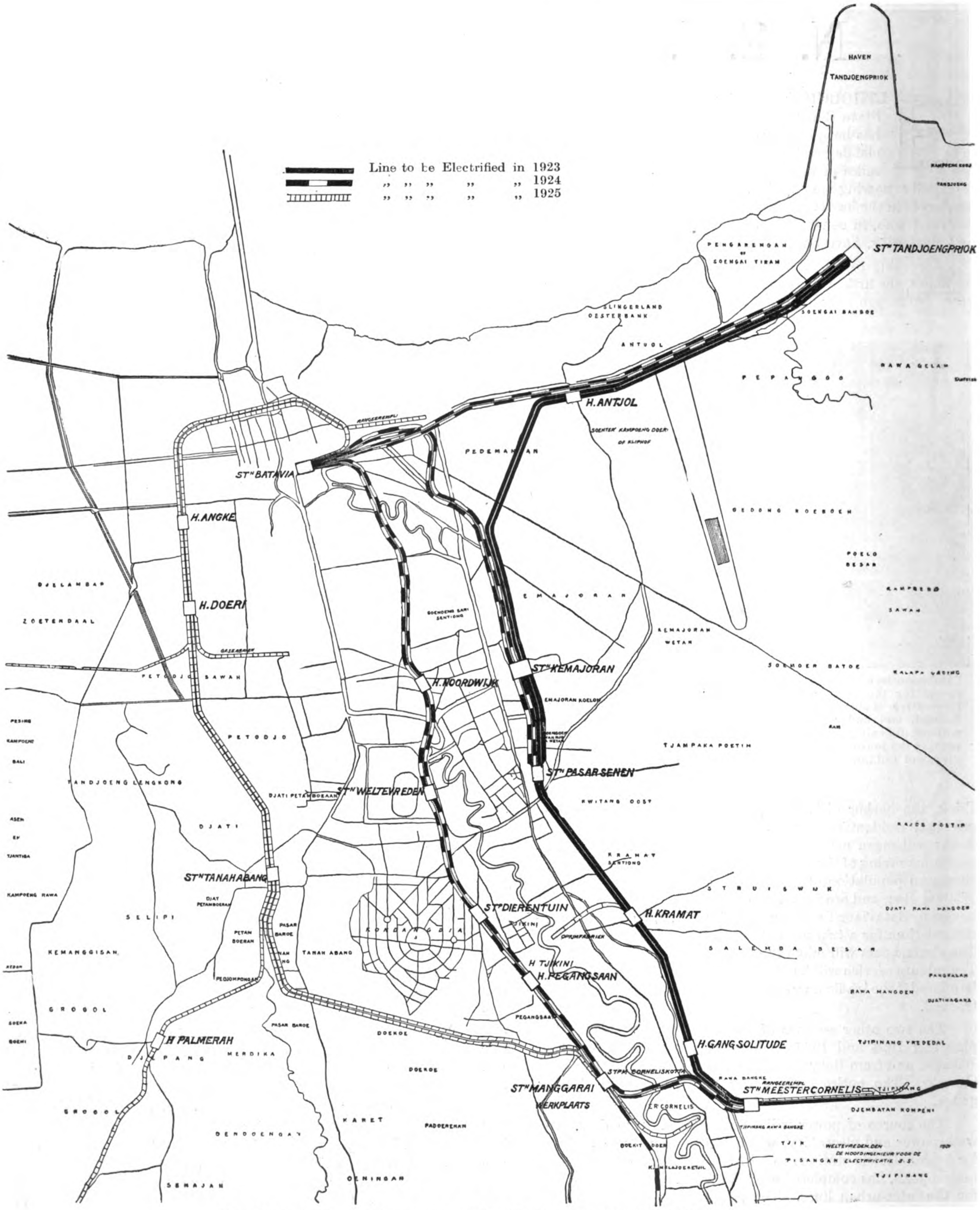
Cammel Laird, of Sheffield and London. The works are to be erected at Manoharpur. A new railway line is to connect the works northward, through Hesla, with Hutar and the Karanpura coal-fields. The iron ore will come from the Keonjhir-Bonai area, and the limestone, probably, from the Gangpur region. The immediate erection of plant capable of producing 300,000 tons of pig iron and 200,000 tons of finished steel annually is contemplated. This output will later be increased to 700,000 tons of pig iron and 450,000 tons of finished steel. The erection of the works will be carried out in three stages of development, during which the B. N. Ry. will have to provide additional rolling-stock on the following scale: First stage, 492 waggons, with 9 locomotives; second stage, 4,113 waggons, with 74 locomotives; third stage, 7,723 waggons, with 139 locomotives.

(5) THE EASTERN IRON CO. is to be erected in the vicinity of the Jherria coalfield, and will obtain its supplies of ore and flux from much the same localities as the Indian Iron and Steel Co.

(6) THE KIRTYANAND IRON AND STEEL WORKS, near Sitarampur, in Bengal, is to be established for the production of iron and steel castings in a smaller way.

When these several companies are in working order they would have a total estimated output of 1,500,000 tons of pig iron and 1,000,000 tons of steel annually. Production on such a scale will result, obviously, in the erection of mills for the out-turn of finished iron and steel materials, such as sheets, plates, bars, joists, etc.

Messrs. Thornycroft have already established a works in Calcutta, and various existing firms, such as Messrs. Burn & Co., Martin & Co., etc., are capable of carrying out steel structural work on a large scale. Other engineering works for the manufacture of machinery, such as the various railway waggon and locomotive shops, are enlarging the scale of their operations, and new enterprises are certain to follow with the revival of trade.



Map of Batavia, showing the program of electrification of the Java-State Railway system

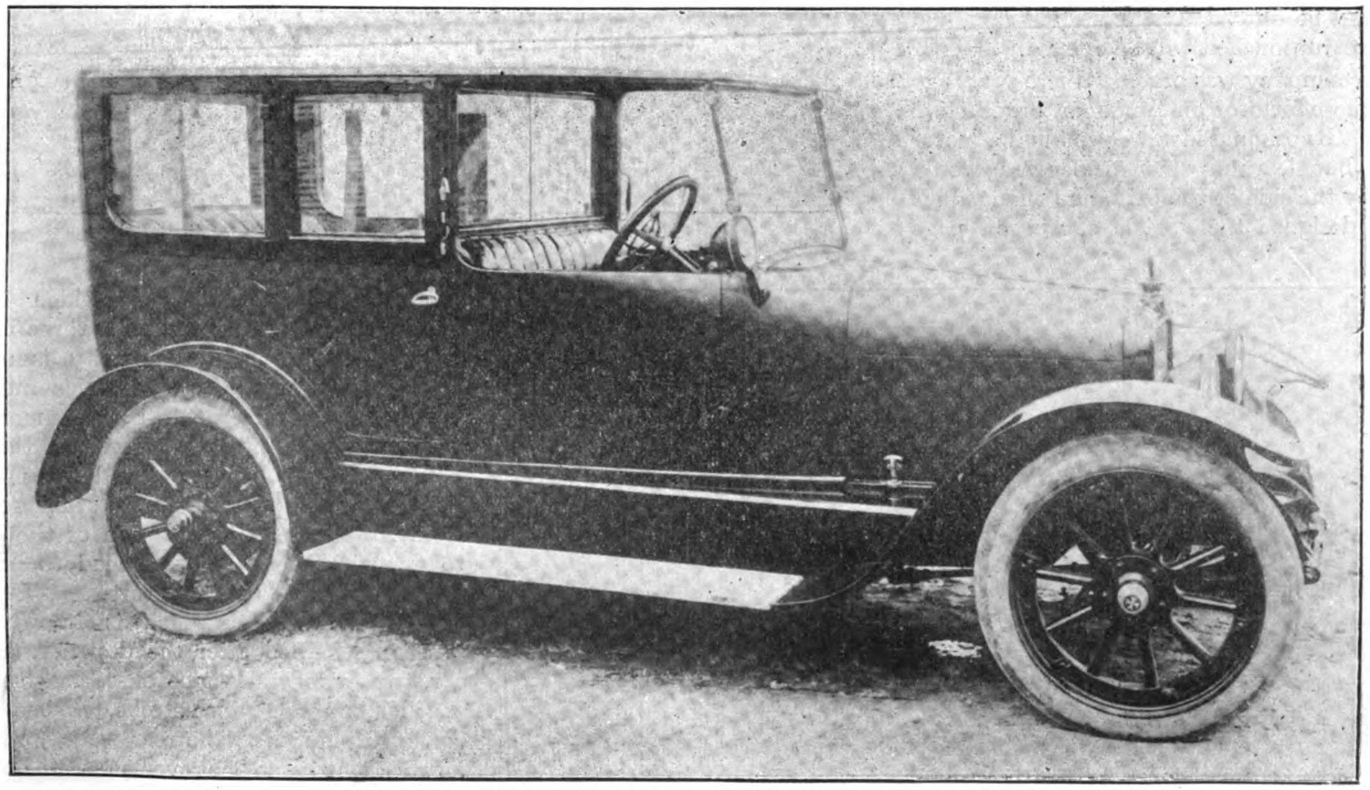
The
FAR EASTERN MOTORS
MOTORING-AERONAUTICS-MOTOR BOATING

Motor Manufacturing in Japan

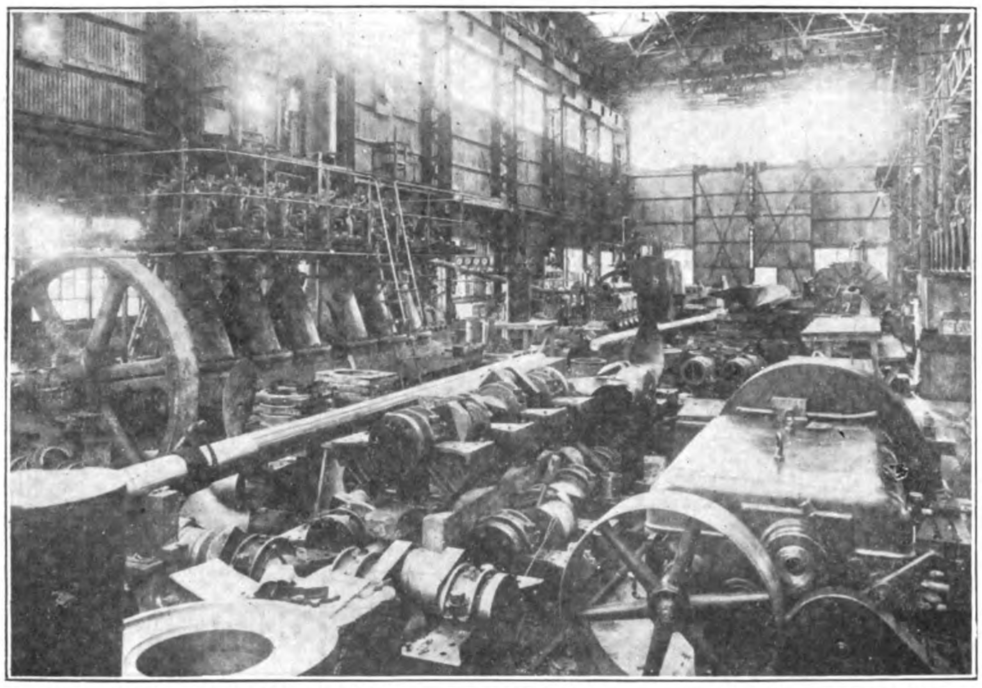
Interview with William I. Irvine, U.S. Trade Commissioner

MR. WILLIAM I. IRVINE United States trade commissioner, now touring Asia investigating and reporting on the automobile markets of this part of the world for the benefit of American manufacturers, has concluded a very comprehensive survey of the Japanese field. After some time spent in Korea, Manchuria and Central China, he is now on his way towards the Malay States and Java. In an interview given to THE FAR EASTERN REVIEW Mr. Irvine gave his opinion of the possibilities of motor manufacturing in Japan. Asked whether in his opinion it is possible for Japanese manufacturers of autos and trucks to compete with American and European makers, Mr. Irvine said that at present "two methods of motor vehicle manufacturing are being tested now in Japan: assembling with imported units, and the manufacture of the complete vehicle within the country. The success of both are now in the balance, and the results obtained will probably decide the question for those manufacturers in other lines who are giving serious thought to this industry. Both tests are being made with cars the answer to the truck question having been given, it being that, on the whole, trucks cannot profitably be built to meet the competition of American vehicles.

"Assembling is now being done by the Ishikawajima Shipbuilding and Engineering Co. Ltd., of Tokyo, of the British Wolseley. The parts are imported from England and are assembled under the supervision of Britons by Japanese workmen, some of whom have been trained in England. Present production is said to be ten of the 10 horse-power type per month, but this could not be confirmed. The specifications are: 4 cylinders $2\frac{9}{16}$-in. by $5\frac{3}{4}$-in. with 1,700 RPM developing a speed of 40 miles per hour. Tread 3-ft. 10-in., overall length of chassis 10-ft. 7-in., overall width of chassis 4-ft. 8-in. allowing a body space of 5-ft. 5-in. by 2-ft. 3-in. with a 99-inch wheelbase on detachable 28-in. wheels. The total



Mitsubishi Body on a Templar Chassis.



Kobe Works of the Mitsubishi Company. Motor Department; Erecting a 400 H.P. Diesel Engine for Electric Generating Set.

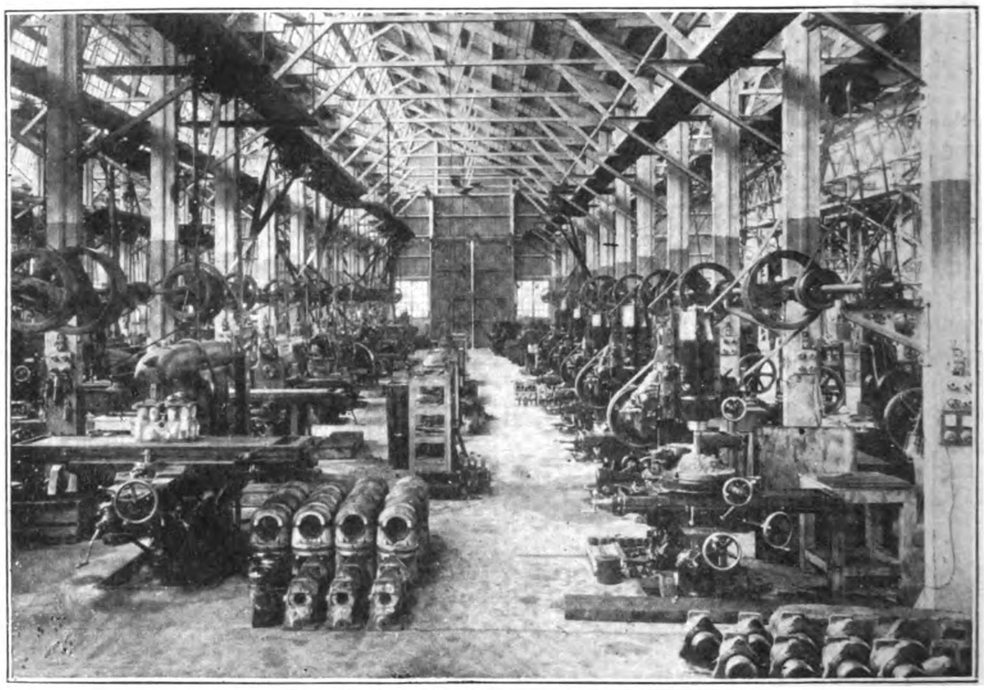
width of the chassis is 900-lbs. Equipped with electric starting and lighting, it sells for about Y.7,000 (G. $3,500.00). The company also announces that it will assemble the 15 and 20 horse-power type.

" A far more important enterprise from the competitive point of view are the efforts of the Jitsuyo Jidosha Seizo Company, Ltd., of Osaka. Here is a company organized solely for the purpose of manufacturing a car especially suited to the operating conditions of Japan, which has erected a completely equipped automobile factory in which every single unit can and is, with a few minor exception, built. After two years of preparation and experiment, production has begun and if schedules are adhered to, serious competition will be offered American light cars, and fields as yet untouched will be opened.

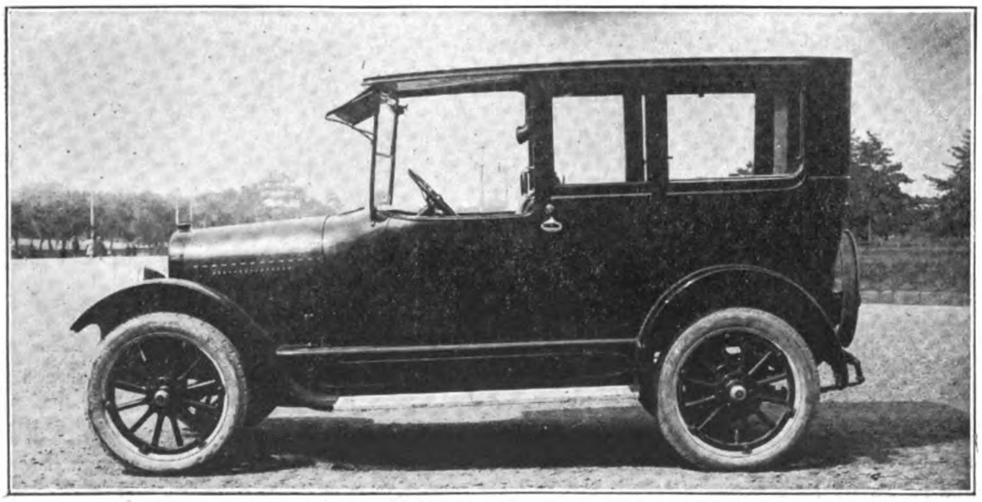
" The company was organized two years ago through the efforts of an American automotive engineer. His original idea was to build a motor rickshaw but learning that passengers would not ride by the side of the driver he changed his ideas and designed the vehicle shown on page 588. The company was organized with a capital of Y.1,250,000 and a site on the outskirts of Osaka was selected on which has been built a modern factory of the saw-tooth type of construction. The buildings are equipped with the latest automotive machine tools imported from America and there are now being made in the buildings parts which in America are ordinarily purchased in the open market, such as bolts, nuts, screws, etc. In addition to the ordinary machine tools such as lathes, stampers, drills, punches, milling machines, gear cutters, etc., the factory has its own forge and heat-treating furnaces, a completely equipped wood-working shop and a paint shop with a spraying machine. The only parts it purchases are tires, rims, spokes, carburetor, magnetos, lamps, generators, friction wheels, chains, sparkplugs and wiring. These are imported from the United States as are the cold rolled and alloy steels as the quality of the latter made in Japan does not meet the requirements of the company.

"Work on the factory was finished August 1921 and up to March 1922, there had been produced 120 machines of which 100 were manufactured during the first three months of 1922. The production capacity is seventy a month and it is believed that this number will be produced regularly within a few months. At the time of the writer's inspection of the factory, production was being delayed by the failure to receive promptly the supply of friction wheels from America. It is the plan of the company to keep sufficient stocks ahead to prevent a similar occurrence in the future.

" The machine which is known as the 'Forham,' named after the designer, is a cycle car, two cylinders V-type air-cooled motor with a 3-inch bore and 4-inch stroke. It has a friction drive with chains to the rear wheels, with three forward speeds and one reverse with an emergency gear box cutting ratios in half, thus providing

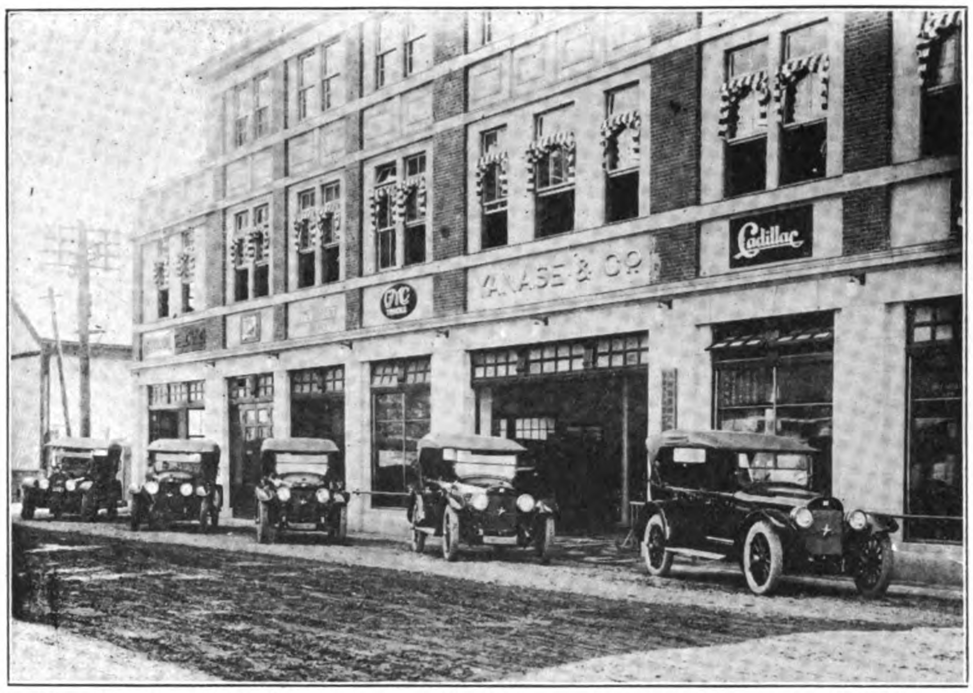


Mitsubishi Kobe Works : Motor Shops.



Buick Limousine: Body Built by the Yanase Automobile Co., Ltd., Tokyo.

three extra low speeds for hill climbing. The wheel base is 72 inches and the tread is 38 inches giving a turning radius of 12 feet on the four-wheel type and 9 inches on the three-wheel machine. The wheels are equipped with standard 28 by 3 American tires. The car has a speed of 30 miles an hour with a fuel consumption of 30 miles to the gallon which the designer says is equal to 50 miles on American roads. The weight of the car with body is 800-lbs. The selling price of the three-wheel type with passenger body is Y.1,550 (G. $750.00) and Y.1,650 (G. $850.00) for the four-wheel type. Several type of delivery bodies are made which sell for Y.1,450 (G. $725.00). The selling prices appear to have little relation to the cost of production, and it seems certain that the company has in mind to undersell a popular American car which has been most successful in the country districts.

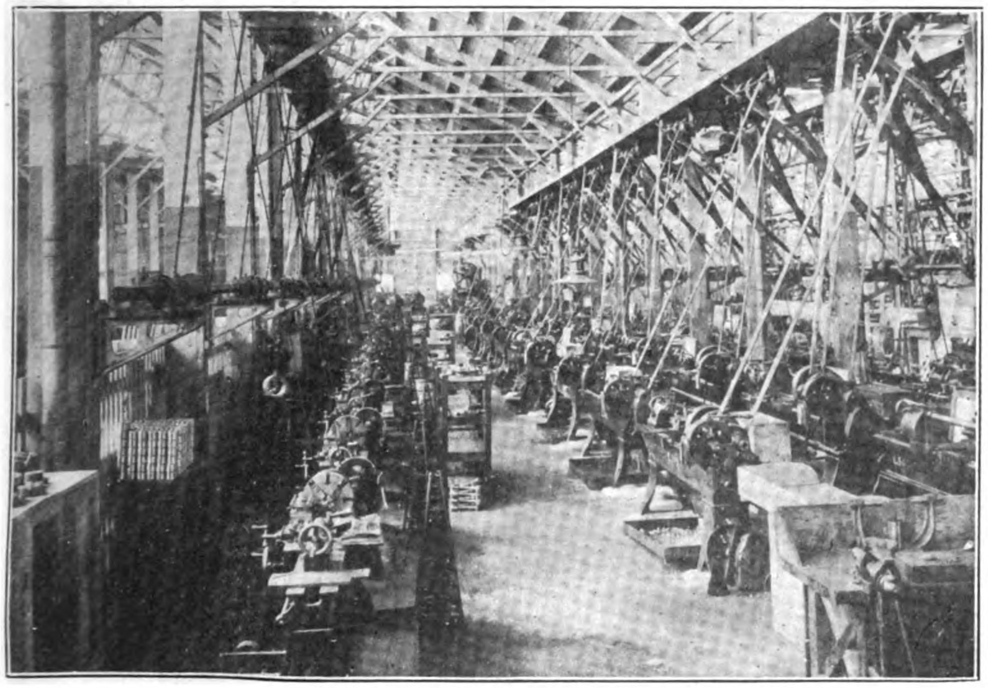


New Building of the Yanase Automobile Company, Ltd. Tokyo; showing 4 Buicks Model 22-49 delivered to the Japanese Army and one Cadillac. Two-thirds of the ground floor space is devoted to showrooms and the rest to accessories and parts.

"A test ride proved the adaptability of the car to road and traffic conditions but also demonstrated that it was very uncomfortable, that it is very noisy and that gear changing was accompanied by jerks. The riding quality was not equal to any American car and this was admitted by the designer who maintains that the car will not compete against the average American car as it was designed to supply a need for a fast vehicle on the narrow roads of the interior.

"At the time of the inspection no selling organization had been completed, the attitude of the directors being to make a number first and then build a selling organization. A few cars had been shipped to Tokyo and sold but the car by no means was being pushed by sales campaigns. Until the army annual test held in May of this year it was not generally known among the Tokyo dealers. Its appearance at the test was a surprise to many.

"Whether the company will be able to go forward is an open question. The designer and his assistant, who are also in charge of production, have been working under a contract which will expire in a few months and it debatable whether it will be renewed. The contract called for the designing of the car, the supervision of the erection of the plant and the starting of production. Now that these have been done the owners are anxious to take full charge and place Japanese engineers in the executive positions and be responsible for productions although the latter, it is said, have had no experience in automotive machine production. The Americans tell a highly interesting story of the trials and tribulations of getting the plant under way and even at the present time they are compelled by necessity to 'take a hand' at work which requires extreme mechanican nicety. All the workmen have had to be trained as naturally there is a scarcity of skilled mechanics for automotive work. The present force has to be supervised very carefully. The engineers state that although individual wages are lower than for the same class of workmen in the U. S., a greater number are required to produce the same amount of work, so that there is little difference in labor costs. Unquestionably the enterprise will bear watching.



Mitsubishi Kobe Works: Motor Shops.

"Attempts have been made by others to manufacture but the ventures have not been successful. The Mitsubishi Internal Combustion Engine Manufacturing Co., Ltd., has erected a large modern plant at Nagoya for the major purpose of manufacturing aeroplane engines, it having secured the manufacturing rights of the Hispania-Suiza for Japan. This company is controlled by the Mitsubishi family, one of the two largest family firms in Japan. with ramifications that touch almost every activity in the country. At this plant, operating under a government subsidy, 20 trucks and 6 cars were manufactured about a year ago, but the cost was so far in excess of what vehicles of similar quality could be purchased in the open market that the manufacturing was discontinued. According to Dr. K. Ito, managinag director of the company, who has made a very extensive study of production methods of automotive factories in America and Europe, the Japanese market does not warrant, at present time, the investment of capital in automotive manufacturing enterprises. To manufacture on a scale that would bring the unit cost down to a comparable figure with American makes would require a home consumption of at least 1,000 cars a year, a figure which seemed impossible of attainment for a single make for a long time. To make up this figure by exporting he did not think possible for the reason that a car which a Japanese company could sell for Y.3,000 (G-$1,000.00) could not compete in quality successfully with American

THE SHIBAURA WORKS OF THE YANASE AUTOMOBILE CO., LTD.

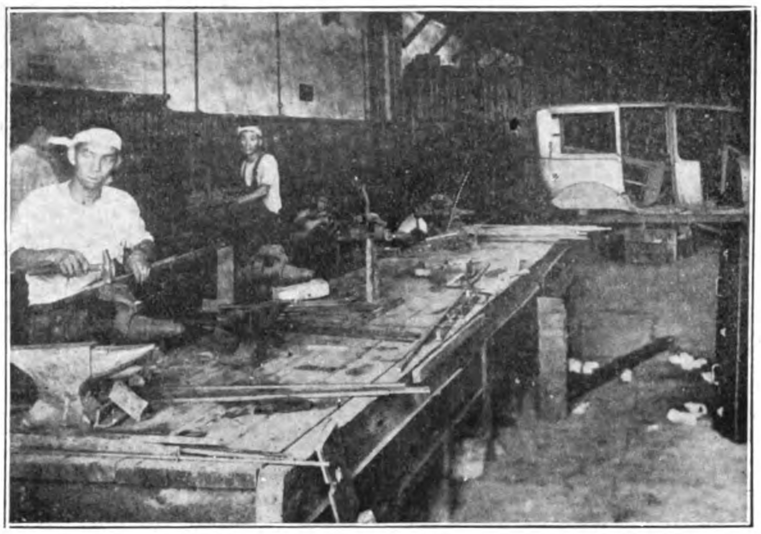
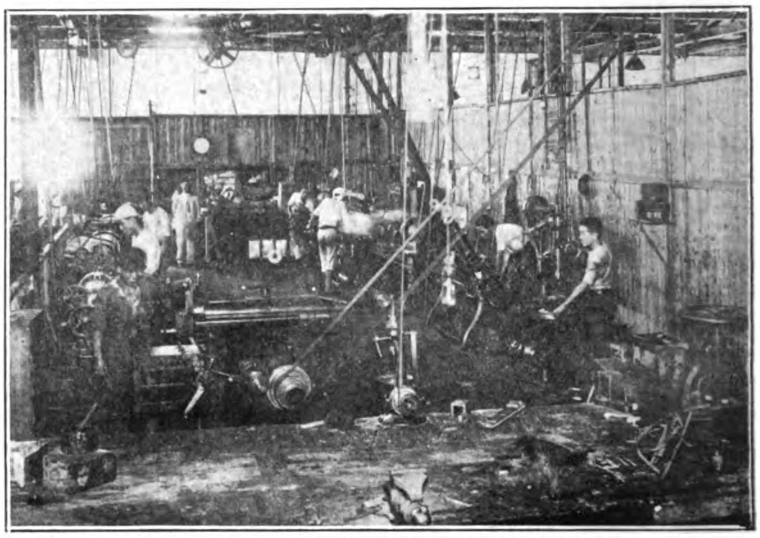
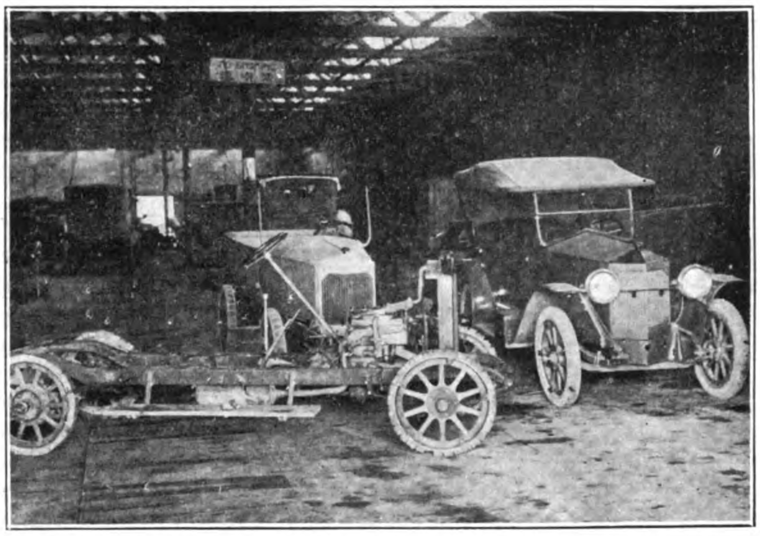


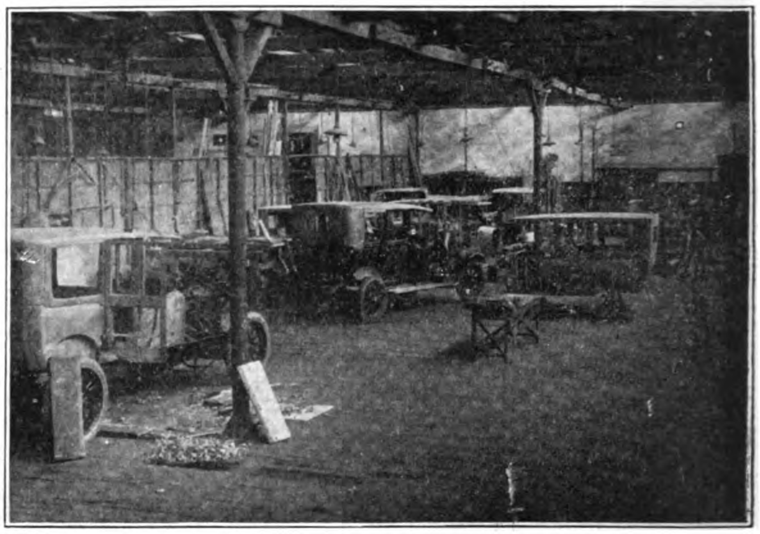
Plate Iron Shop.



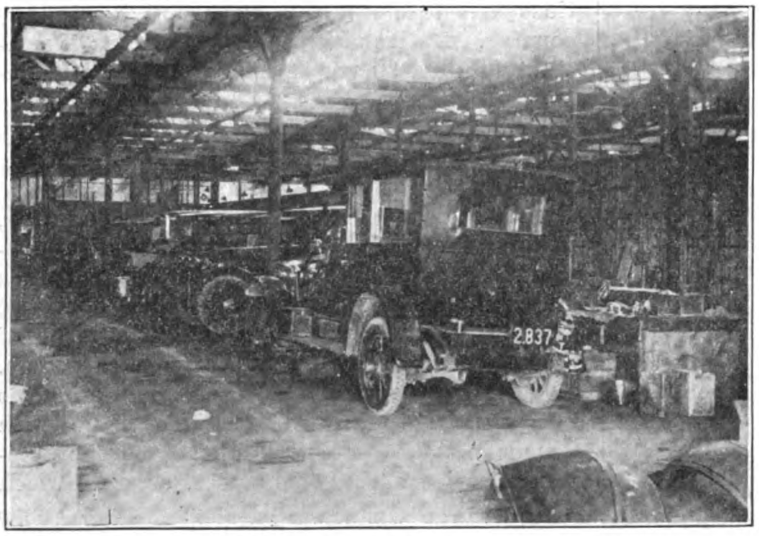
Machine Shop, equipped with Universal Miller, lathes, drills, grinder, planer and boring machine.



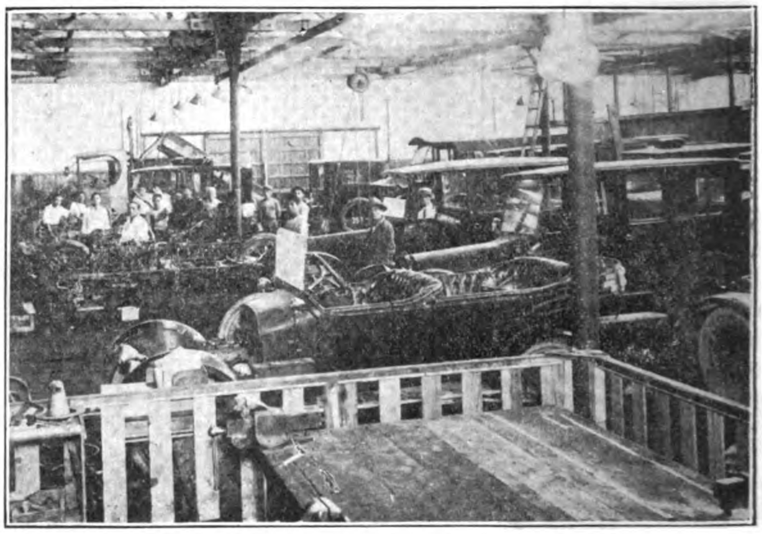
The Machine and Body of this Car was designed and manufactured by the Yanase Factory.



Body Building Shop.



Paint Shop.



Repair Shop.

cars in the same price class. At the present time his company is confining its efforts to the manufacturing of aeroplane engines.

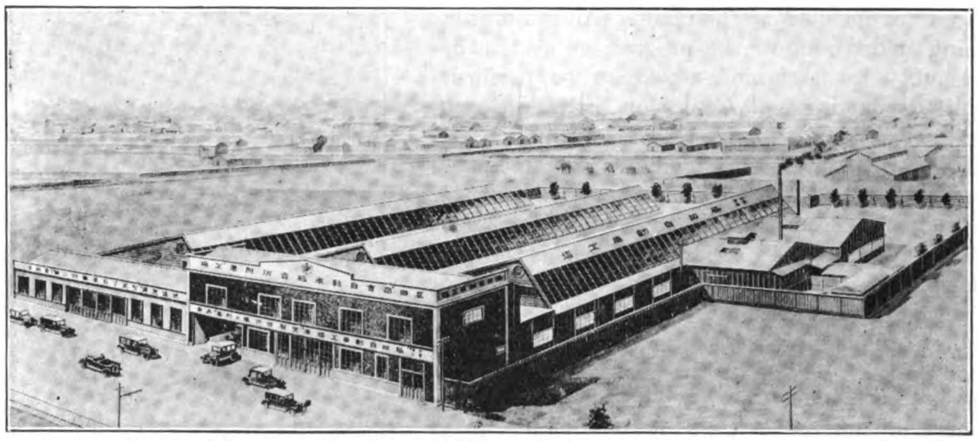
"The Tokyo Gas and Electric Co., which controlls the agencies to a number of American and European vehicles, built under government subsidy, about 100 trucks for the army. These are of two-ton capacity and appear unusually heavy, almost clumsy. An executive of the company expressed the opinion that they were too heavy and did not compare with American vehicle, and were not altogether satisfactory. This appears to be borne out by the fact that the army is now a regular purchaser of American trucks and that the Tokyo Gas and Electric Co. has discontinued truck manufacturing and is concentrating its combusition engine work to the manufacturing of aeroplane engines, it having the Japanese right for manufacturing the Gnome engine. The company has a very large plant, about six miles from Tokyo, where it manufactures gas and electrical apparatus and measuring instruments. It is not, as its name might imply, a public utility company. The major interest in the company is supposed to be held by the Matsukata family.

"The Yanase Automobile Company is one of the largest distributing companies in Japan and controls a fine line of American cars and trucks. It was supposed to be manufacturing cars at the rate of 60 per year but investigation proved that but two cars had been made and none sold. This car is known as the "Y" light car and no attempt has been made to create anything original. It is a conventional four-cylinder engine cast in one block with three point suspension, valve in head with removable cylinder head. The bore is 3-in. with a 4.25 stroke developing 14 horse-power S. A. E. rating. The thermosyphon cooling system is employed with a tubuler pointed radiator. Lubrication is affected by a constant level splash system operated by a gear pump. Other specifications are: Electric system—three unit, Delco ignation, Bijor generator and starting motor and high efficiency storage battery; clutch, cone type, leather faced: transmission-unit with engine, selective type, sliding gear with ratios third 1:1, second 1:2.04, first 1:3.2, reverse 1: 3.88, propeller shaft, bare shaft carries universal and slip joint at each end, torque rod equipped: rear axle, three-quarter floating, reduction of drive gear 4.23, adjustable pinion gear: brakes 10-in. diameter by 1¾ with drum attached to rear wheels, hand brake is internal expanding and foot brake external contracting, front axle, cast steel integral with yoke, steering left-hand drive, half nut gear type, turning radius 17-ft.: wheels, artillery type, demountable rim: springs semi-elliptic, front 1½-in. by 32-in., rear 1¾-in. by 42-in. These specifications are furnished by the designer.

"The intention was to manufacture a car to sell for Y.3,000 (G. $1.500) but the experimental work proved that the car could not be produced to sell for less than $3,000. Mr. Yanase was very doubtful if more would be made, future production depending on the development of market conditions. The facilities of the company are not such as to lead one to believe that successful manufacturing could be carried on without the erection of a new factory, as the present plant was primarly laid out for the repairing of cars and building bodies. The efforts of the company for a long time may be discounted. It is supposed to have the support of the Mitsui family but this is an open question. The only connection discoverable is that the Yanase company is financed through the Mitsui Co.

"Trucks have been manufactured in army arsenals and, it is reported, by the Kawasaki Dockyard Co. of Kobe. At these places permission is not granted to make inspection but it is generally understood that the Kawasaki Co. is not manufacturing now, mainly for the reason that the subsidy granted by the government is not sufficient. As far as could be ascertained there is no manufacturing in Japan in order to get the benefits of the subsidy as it was found that the amount granted and the conditions under which it was granted were unsatisfactory.

"Two other companies have experimented with car assembly, but the results have never been placed on the market, and it can be assumed that aside from the efforts of the Jitsuye Hidosha Seizo Co. American manufacturers need not fear the competition of Japanese-built motor vehicles.



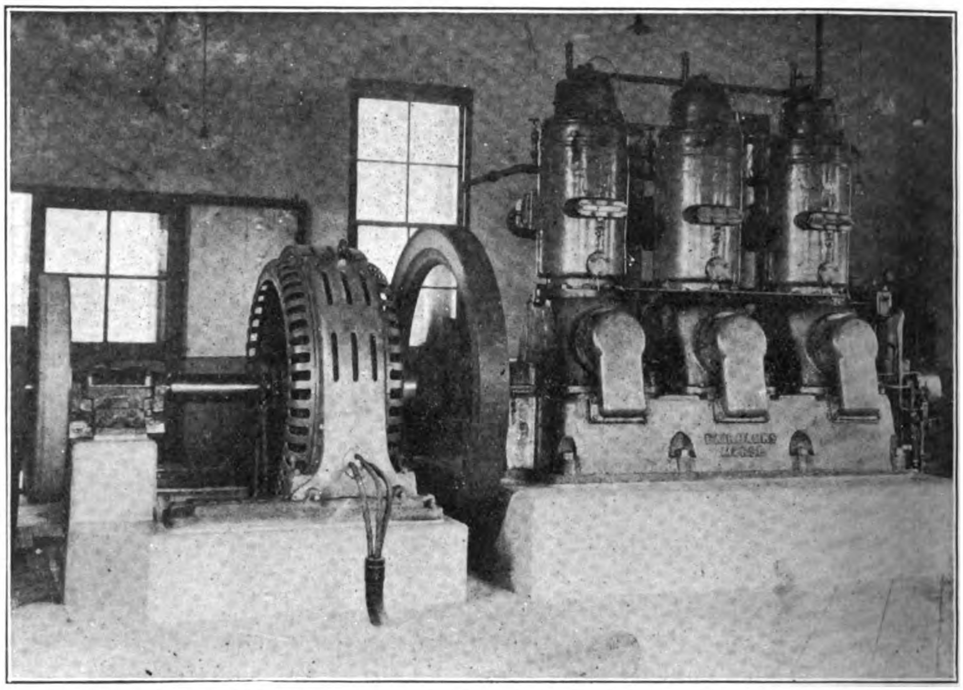
Automobile Assembly Plant of Takata & Company, Shibaura, Tokyo.

American Assembly in Japan

"At the present time but one American car is being regularly assembled at a plant in Yokohama. The cars are received in a knocked down condition with the engine and other large units already assembled. They are erected by Japanese workmen under the supervision of an American superintendent and a foreman from the American factory. Unassembled bodies are also received and

Magnificent new Office Building of Takata & Company, Tokyo, showing Cars owned by Company Officials.

these are finished at the plant. An attempt is being made to follow the progressive system of assembly by assigning workmen to perform limited operations. Conveyor belts are not being used in the plant, the cars being pushed along a raised track as is shown on page 589. From time to time the workmen are instructed on modern assembly work by motion pictures of the main plant in America. This also serves the purpose to check assumptions of complete knowledge, a tendency, which at times, was found difficult before the picture lessons were introduced. Skilled mechanics are never employed as usually they are hard to teach because of the belief that having worked in a machine shop or a garage they need no further instruction. Coolie labor is employed and with patience and a great deal of instruction the men become efficient.



The Power Plant of Sale and Frazar's Ford Assembly Plant at Negishi; 150 H.P. Fairbanks Morse Semi-Diesel Engine and Generator.

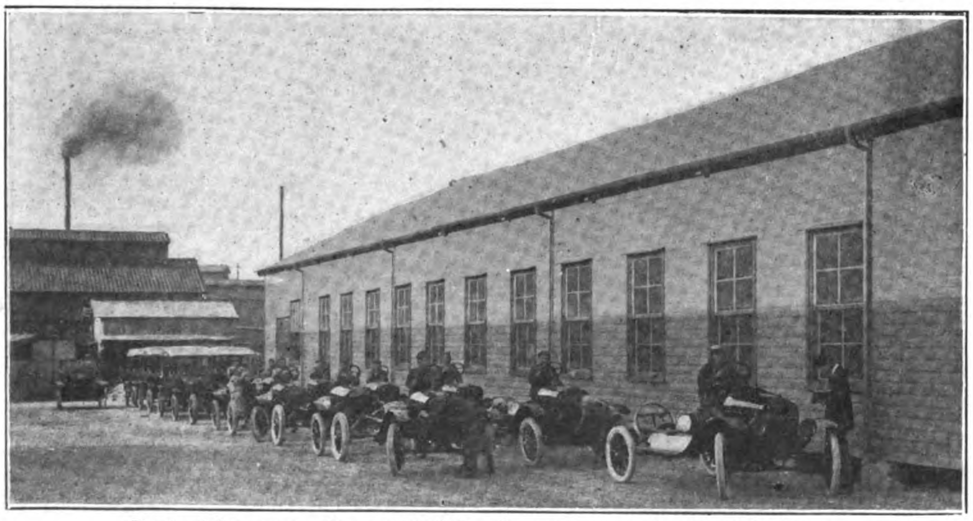
Several dealers have attempted assembly in a small way but have found that the expense of erection was greater than any saving affected. From the experience of the one successful company and those who have relinquished the idea it appears that assembly in Japan for that market alone is not justified unless at least 75 cars a month can be passed through the plant. But little can be saved on duty on each vehicle as cars partly disassembled can be imported on a basis of 25 per cent. *ad valorum.* It has been found that any possible savings which might be made by shipping quantities of each unit in single cases is more than offset by the expenditure of time and labor in the shipment. Various duties cover different parts and some of these are less than 25 per cent. but to pack and list these separately would require very elaborate billing and shipping instructions which is not justified by the saving. The distributers now assembling have looked thoroughly into the subject and have decided against it, and their experience can serve as a guide to others who might be contemplating such action. As to using Japan for the assembly of vehicles for the Far Eastern market, the writer is not prepared to say until the other markets have been surveyed. At present, however, assembly with the whole East in mind is not being done by any company, although it has been investigated by several.

Body Building in Japan

" Because of the saving which may be effected on freight, duty and interest charges on capital invested there has developed in Japan a body-building industry which is equal to meeting all the requirements of the market for car and truck bodies. But unlike the industry in America it is not specialized but has grown to its present proportions as an adjunct to the organization of the distributers. And by reason of its being a side line it imposes a burden on the parent industry which works to the disadvantage of both. Several dealers were frank enough to admit that their body-building establishments were run at a loss and agreed that cheaper and better bodies could be built by specialized shops.

The size of the shops are in proportion to the volume of the dealer's sales. The great majority of the cars and trucks imported are brought into the country without bodies, the exception generally being to meet the small demand for open cars or the cultivated taste for high-class custom bodies for high price cars, for although Japanese bodies are attractive they fall short of meeting the high standard of the custom body builders in America and Europe.

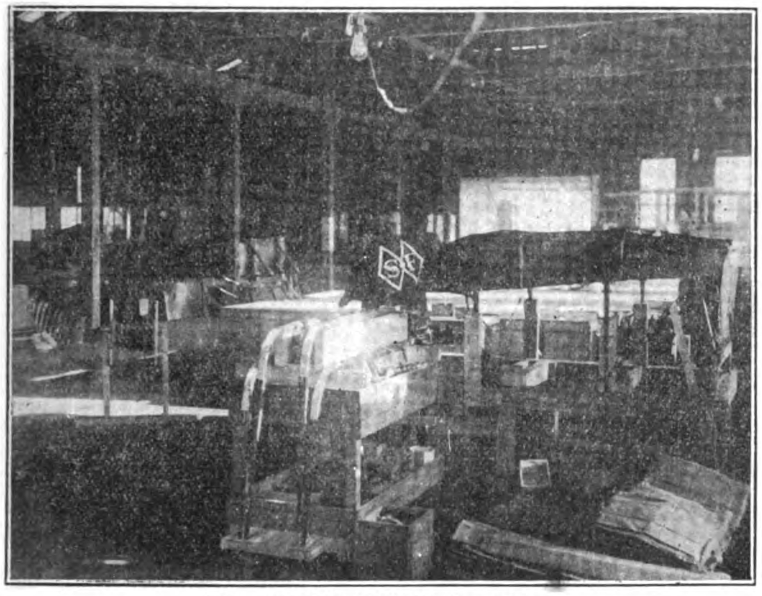
The building devoted to body building are almost without exception of wood with unpaved floors and without adequate machinery. The majority of the bodies are built of wood, although a demand is growing for metal bodies owing to the comparatively short life of wooden bodies which rarely present a good appearance after the second year due principally to warping and varnish cracks. The cause of this is the absence of kiln dried lumber, and the excessive amount of rain. It is probable that the use of metal bodies will increase, two plants now being equipped with metal working machinery. Curiously, even in the shops where modern machinery is used, laborers can be seen working with antiquated hand tools such as the adz, one way saws and scrapers.



Day's drive away of assembled Ford machines at the Negishi Plant.

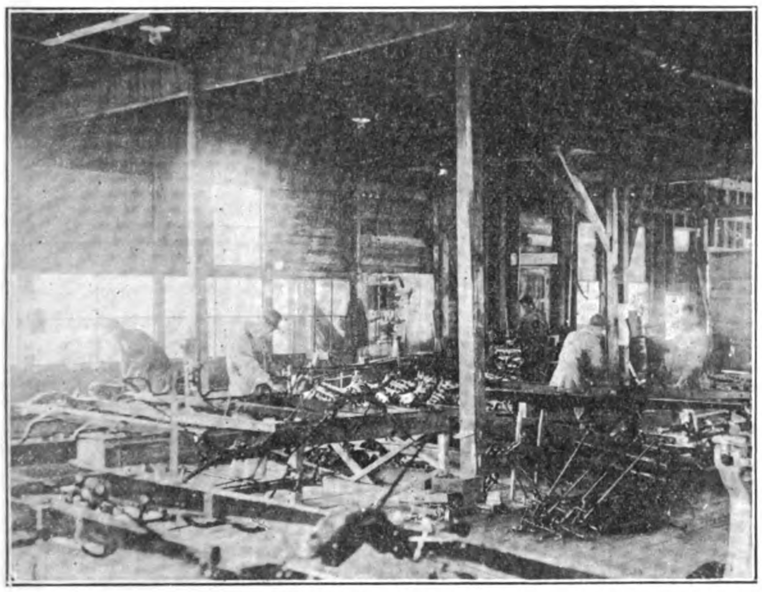
A fairly hard wood is used which lends itself readily to being worked to a smooth finish. Practically all bodies made in Japan are of the limousine type built to accommodate five people inside. The interiors are well finished and compare favorably with the average American job of the same type. Bedford cord is used in upholstering and there are the usual accessories to comfort such as speaking tube, arm rests, flower holder, ash receiver and

SALE AND FRAZAR'S FORD ASSEMBLY PLANT AT NEGISHI, YOKOHAMA

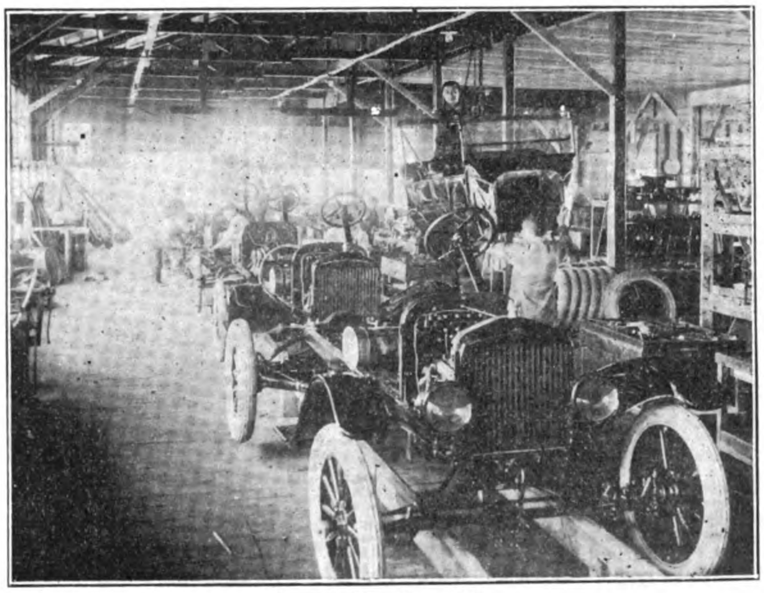


Top and Wind Shield Assembly.

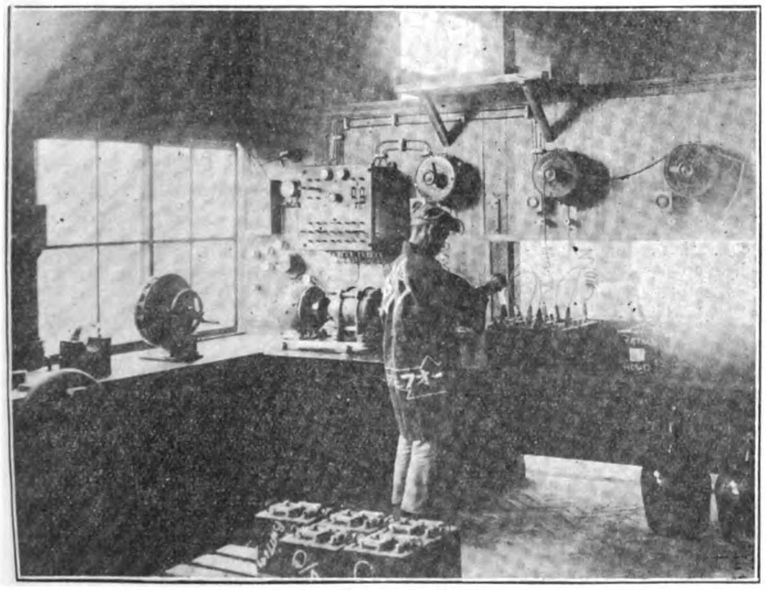
Paint Shop.



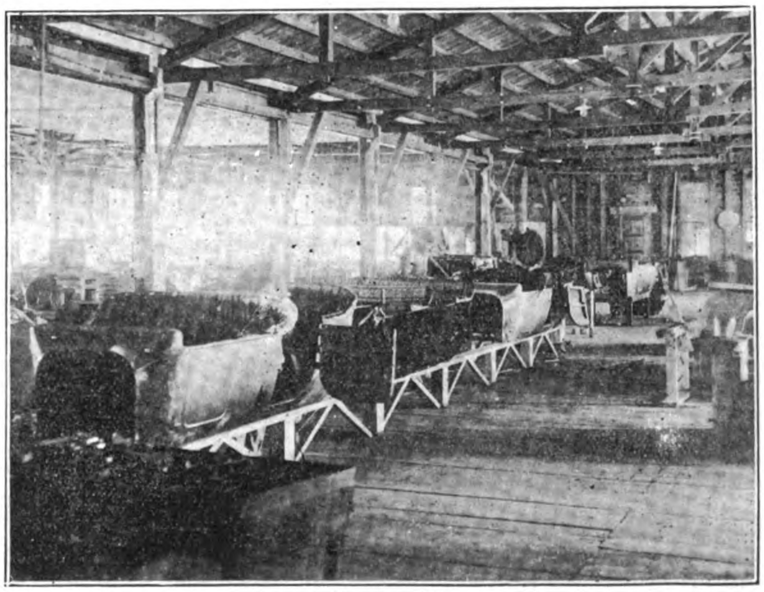
Rear Axle Assembly.



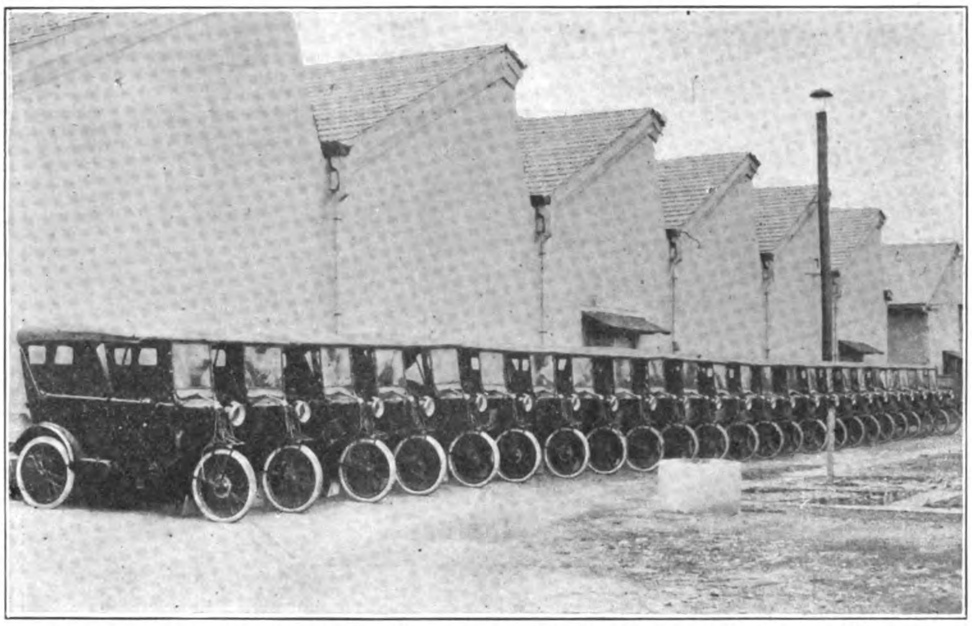
Progressive Assembly.



Battery Charging Room.



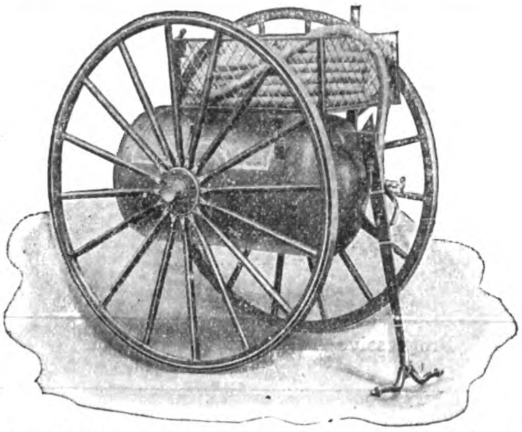
Body Assembly.



Jitsuyo Automobiles Ready for Shipment outside the works of the Jitsuyo Jidosha Seizo Company at Osaka.

silk curtains to match the upholstery. The bodies are finished with Japanese lacquer. From six to twenty-four coats are applied, and prices range from $750 to 1,500. The average price is about $1,000 for a body comparable to what is generally furnished on a medium price American car. Truck bodies to meet special requirements can and are occasionally built but as a rule, standard platform and stake bodies are supplied which cost approximately $300.00. A standard buss body with aisle seats to accommodate 12 passengers is furnished for $1,000. The bodies of busses are usually crudely finished.

There is unquestionably an opportunity for the organization of an efficiently equipped and managed body-building plant and it would be to the best interests of the dealers to turn their work over to it for under the present practice of separate body-building plants an unnecessary amount of capital is required to conduct a motor distributing agency thereby limiting not only the operations of present dealers but serving to check new capital."



No. 14 Chemical Fire Engine is hand drawn. Light and easily movable, Forty gallon capacity, non-corrosive tank. Fifty feet of hose with shut-off nozzle.

LIST OF PRODUCTS

Aerial Trucks ; Motor Driven Fire Engines ; Chemical Engines ; Fire and Chemical Extinguishers ; First Aid Equipment ; Hose and Couplings ; Hose Reels and Carts ; Lanterns ; Smoke, Gas and Ammonia Masks ; Fire Boat Pumping Units ; Respirators ; Sirens ; Miscellaneous Fire Department Supplies ; Babcock Firemen's Suits ; Hydrant Thawing Devices ; Tractors ; Water Towers ; Commercial Motor Trucks ; Hand Drawn Pumping Engines.

AERIAL TRUCKS WATER TOWERS — AMERICAN LAFRANCE FIRE ENGINES — CHEMICAL ENGINES — HAND FIRE EXTINGUISHERS — FOUNDED IN 1845

When the Fire Bell Rings

Every second costs money. The time to stop a fire is before it gets under headway. In order to avoid costly delay, proper fire-fighting equipment is necessary. American LaFrance equipment by its quick and efficient action has saved millions of dollars of property from fire in all parts of the world.

Write to-day for further particulars to one of the following:—

Okura & Co., Tokyo, Japan.
Cary & Co., Canton, China.
Milton E. Springer Co., Manila, P.I.
Mustard & Co., Shanghai, China.
Andersen, Meyer & Co., Ltd., Foochow, China.
Dodge & Seymour (India) Co., Ltd., Calcutta, India.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

Export Department, Fisk Building, Broadway at 57th Street, New York, U.S.A.

Cable Address : "AMLAFRANCO"

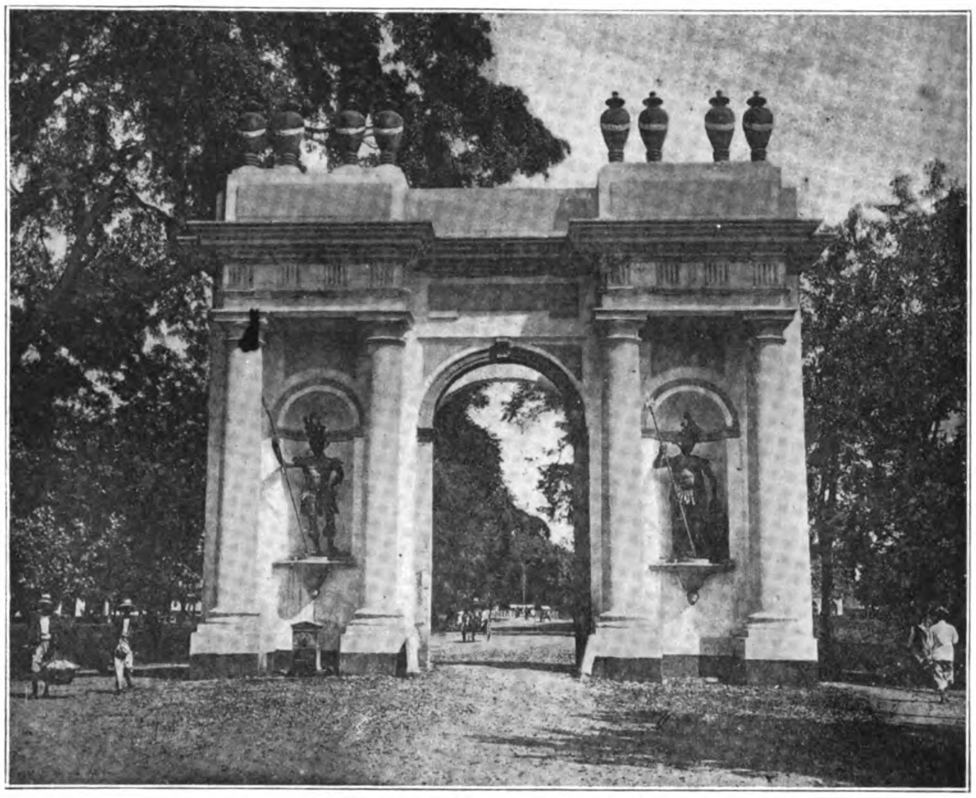
Codes : A.B.C. 5th Edition Western Union, Bentley's

Motors and Roads in the N. E. I.

Working Results of the State Railway Motor Services

By L. C. Blochman

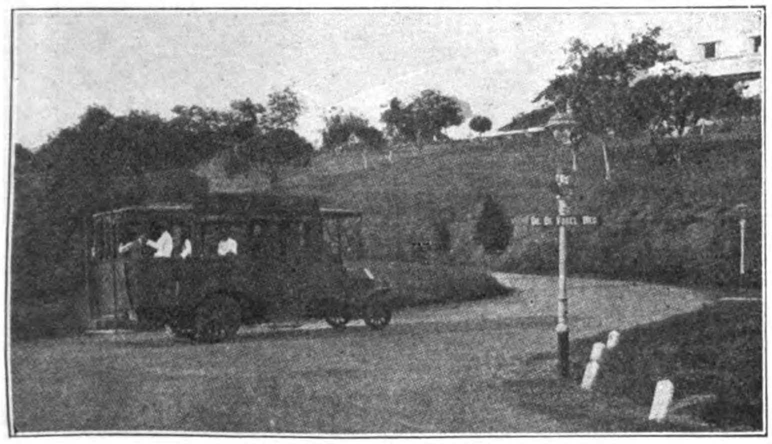
THE general state of a country's business can generally be judged by the state of the second-hand car market. The depression caused in Java by the fall in rubber, sugar and coffee is plainly reflected in the number of used automobiles which can be bought for ridiculous prices to-day. Some dealers, caught with large stocks of new cars, are putting their surplus stock into taxi service. Several new "for hire" establishments have sprung up in Batavia, Semarang and Sourabaya since the demand for motor cars has dropped off.



Penang Gate in Batavia (Lower Town)

Java dealers look for a revival of the automobile business at the first signs of better general conditions. There are already 18,700 cars registered in Java, 85 per cent. of which are of American make. Medium-priced cars are in great predominance, most of the American quoto being drawn from the Ford, Dodge, Buick, Chevrolet, Oakland, Hudson and Essex. Among the European machines, the Fiat leads the list, with the Citroen, Wolseley and Minerva in close competition. The Swiss Pic-Pic, the Mercedes and the Austrian Daimler are also finding some sale.

German competition is difficult to meet in price, but shipments cannot be guaranteed on account of the enormous demand for the cheaper cars. Prices also fluctuate with the varied career of the mark, and only Java firms with buyers in Europe can purchase German cars at a price which is not liable to change between mails. No European cars are able to compete with American makes in hill climbing. Inasmuch as most of the roads in Java are through mountainous regions, the superior power on an incline gives U.S. cars a big advantage. The prevalance of hills, together with the high cost of fuel, makes a light car the only kind that has a universal sale in the island.



Motor Bus in the N. E. I.

Java boasts 10,000 miles of motor roads, in good condition and all posted after the French system by the Java Motor Club. The general road plan, the system under government supervision, includes two roads across the island from east to west along the north and south coasts, and five cross roads. As originally planned, the completed system was to cost 5,000,000 guilders, but increased costs in both labor and material have boosted the estimate to 8,533,000 guilders. At the end of 1921, 4,077,000 had already been expended. The provincial plan, which is being carried out by the individual provinces in connection with the general plan, was to have been completed in ten years at a cost of 24,000,000 guilders. A new estimate will place the final expenditure nearer to 40,000,000.

A glance at the table found at the end of this article shows that Java received less than 20 per cent. of the 1921 appropriation for the construction and repair of roads and bridges throughout the Dutch East Indies. As a matter of fact, efforts to develop the outlying possessions have called for great expenditure on highways. In many places, the Java state railways have established auto services to reach territory not served by rail connections. This is particularly true in Sumatra, which has received the lion's share of the appropriation for the outlying islands.

At the end of 1918 there were nine roads completed and 17 building, with an expenditure of 15,630,000 guilders. At the end of 1921, 12 roads had been finished, 18 were still in the process of construction, and the total expenditure had reached approximately 19,000,000 guilders.

The following figures show the expenditure (in guilders) on roads and bridges in the Dutch East Indies for the past six years :—

	Expended for the Construction and Renewal of Roads and Bridges (Guilders)		
	Java	Outlying Possessions	Total.
1916	1,402,234	3,542,962	4,945,196
1917	1,938,014	3,843,346	5,781,360
1918	1,738,587	3,889,580	5,628,167
1919	1,820,772	4,636,063	6,456,835
1920	1,402,659	6,014,803	7,417,462
1921	1,264,037	6,849,599	8,113,636

State Railway Motor Services

Foremost in the development of motor transportation in the Netherlands East Indies is the road motor department of the state railways which is constantly extending its services into districts which the railway cannot reach. At present, road construction with its attendant motor bus service is being pushed more intensively in Sumatra than elsewhere in the N.E.I. The general road program for that island embraces the construction of 54 roads with a total length of 4,600 kilometres estimated to cost Guilders 63,000,000. The object of this system is to give access to and open up the remarkably rich agricultural and timber lands in the interior. Wherever practicable the roads are being supplemented by motor boat navigation on the rivers and lakes.

By the end of 1921 the states railways were operating five district motor services in various parts of the archipelago, with a total of 3,100,000 car kilometres run during the year, of which, 1,920,727 car kilometres were run by goods trucks and 1,179,605 kilometres for passenger traffic. The working results of these various motor service divisions for 1921 are as follows:

1. SUMATRA'S WEST COAST AND TAPANOELI SERVICE

Manager's Residence, Fort de Kock:

No. of kilometres run by goods motors 446,962

No. of kilometres run by passenger motors 440,278

Receipts: 1920, F. 552,813; 1921, Fl. 637,506.

Expenditures: General charges, Fl. 38,333; Traffic expenses, 70,060; Running expenses, 46,664; Maintenance and repairs, 74,044; Other working expenses, 192,338; Renewals, 1,689; Total, Fl. 423,128. In 1920, 383,228.

Capital Account:

Balance from 1920 ..	Fl. 395,038.30
Additions in 1921 ..	128,410.05
	523,448.35
Depreciation in 1921..	83,616.78
Balance, Dec. 31, 1921..	439,831.57

Provisional Balance Sheet, 1921:

Income: Passengers, Fl. 404,969.62; Goods, 138,274.35; Miscellaneous, 9,569.05; Value of stock, December 31, 1921, Fl. 144,414.12; Total, Fl. 697,727.14.

Expenditure: General charges, Fl. 81,757.26; Traffic expenses, 70,060.46; Running expenses, 300,435.69; Value of stock, January 1, 1921, 108,177; Balance, 137,296.77; Total, 697,727.14.

Net Revenue Account: Interest on capital expenditure, Fl. 22,962.17; Depreciation, 60,-616.78; Net profit, 53,716.82; Total, 137,296.77.

During September this service was extended beyond Sipirok (in Tapanoeli) as far as Sipogoe. During the rainy season the service was greatly handicapped by landslips on the mountain roads, while the service to Pematang Siantar could not be started because the metalling of the road had not been completed.

2. BENKOELEN MOTOR SERVICE

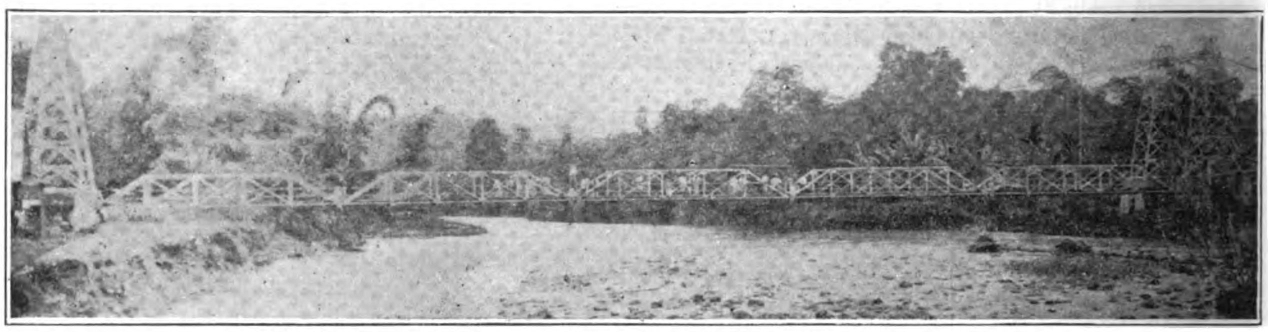
Manager's Residence, Benkoelen:

No. of kilometres run by goods motors 571,121

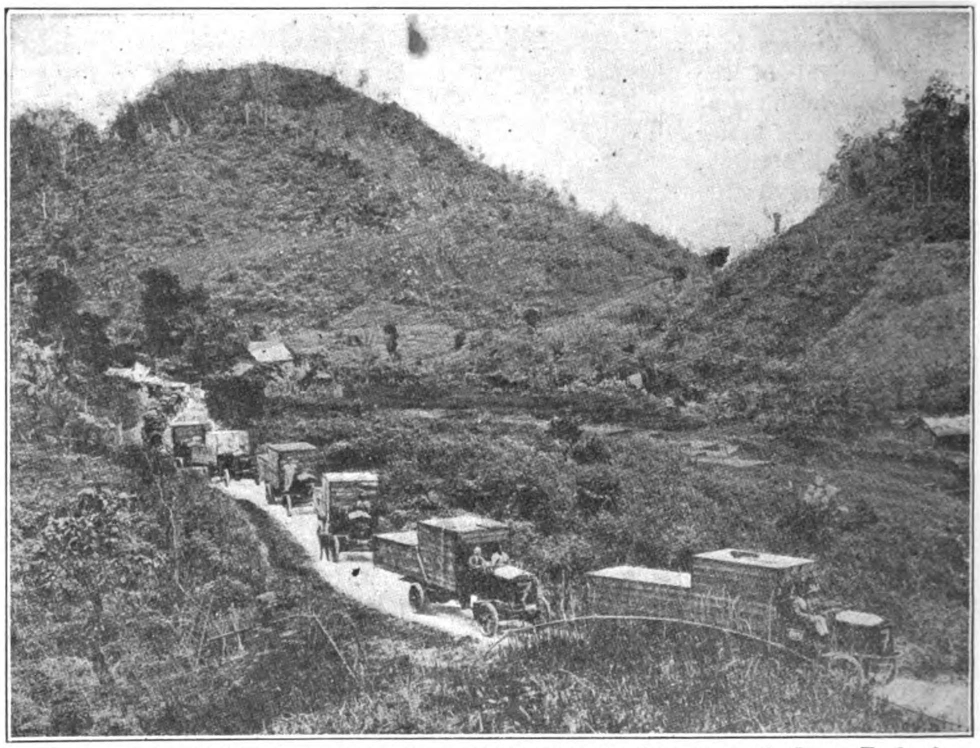
No. of Kilometres run by passenger motors .. 347,428

Receipts: 1920, Fl. 600,810; 1921, 469,810.

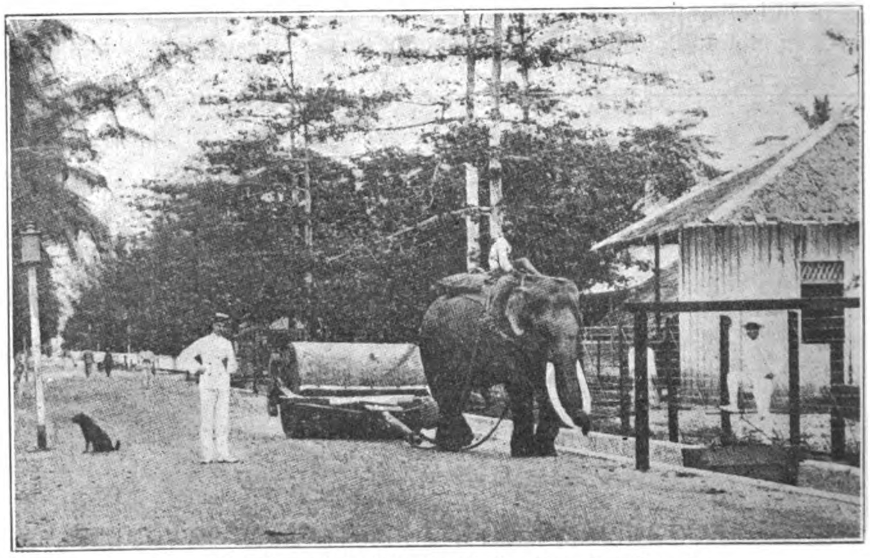
Expenditures: 1921, General charges, Fl. 42,212; Traffic expenses, 70,826; Running, 60,890; Maintenance and repairs, 161,888; Other working expenses, 175,969; Renewals, 4,930; Total, 516,715. In 1920, 565,015.



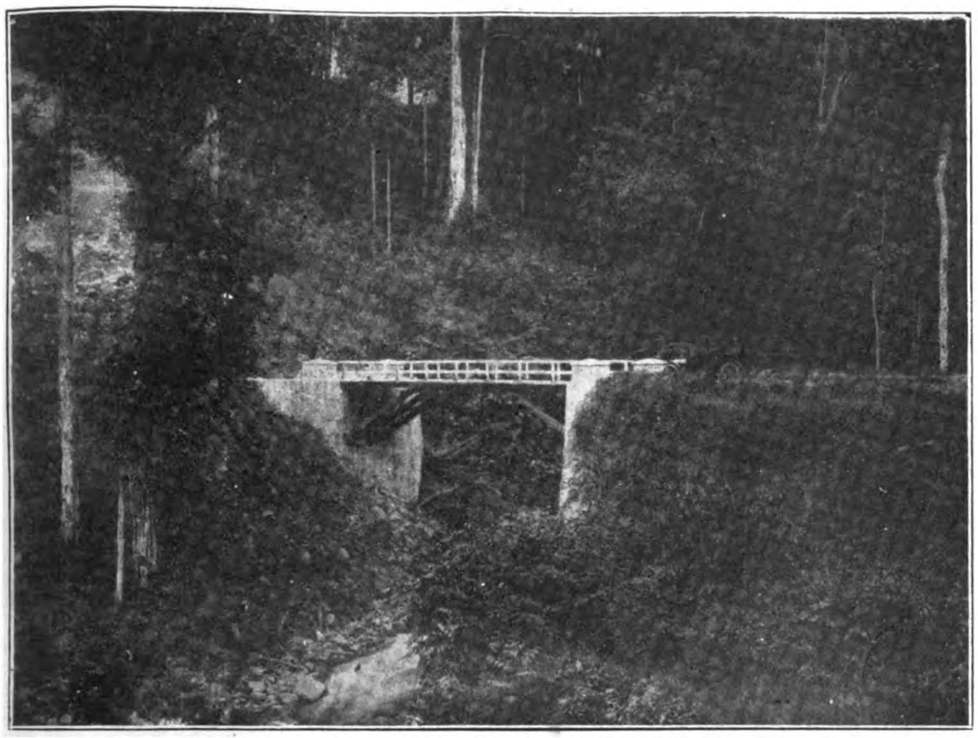
Cable Bridge on the Tjoeroen-Moera Aman Highway, Benkoelen Province



Seventeen Fageol Trucks on their Way to Delivery to the Government in Java—Each of the Trucks Carries Another in a Crate



A Road Roller at Work in Pangkalan Brandan, Sumatra



Bridge on the Main Road to the Gajoe District of Atchin, North Coast of Sumatra

Capital Account:	Balance from 1920	Fl.491,689.89
	Additions in 1921	43,088
		534,777.89
	Depreciation, 1921	130,862.03
	Balance, December 31, 1921	403,915.86

Provisional Balance Sheet, 1921 :

Income: Passengers, 233,510; Goods, 230,430; Others, 5,120; Value of stock, December 31, 1921, 184,820.86; Balance, 65,953.68; Total, 719,834.54.

Expenditure: General charges, 84,986.13; Traffic expenses, 70,826.46; Running, 396,390.95; Value of stock, January 1, 1921, 167,631; Total, 719,834.54.

Net Revenue Account: Balance from income and expenditure account, 65,953.68; Interest on capital exp., 25,661.70; Depreciation, 70,612.03.

Net Loss: Fl. 162,227.41.

This service experienced a strike of drivers and garage men because of strict supervision, but was kept open by the European staff. The service was extended during February beyond Moera-enim as far as Tambang Sawah, government gold fields.

3. Palembang Motor Service

Manager's Residence Morea-enim :

No. of kilometres run by goods motors	Fl.545,918
No. of kilometres run by passenger motors	268,272

Receipts: 1920, Fl. 663,998; 1921, 584,486.

Capital Account:	Balance from 1920	Fl.384,421.31
	Additions, 1922	14,741.33
		399,162.64
	Depreciation, 1921	105,038.02
	Balance, December 31, 1921	294,124.62

Humber

STANDARD MODELS.

11.4 h.p. 2-Seater (with double Dickey Seat)
11.4 h.p. Coupé (with double Dickey Seat)
11.4 h.p. 4-Seater 15.9 h.p. 5-Seater
11.4 h.p. Saloon 15.9 h.p. Saloon

HUMBER LIMITED.

Works:

COVENTRY, ENGLAND.

Export Dept.:

Humber House, 94 New Bond St.,

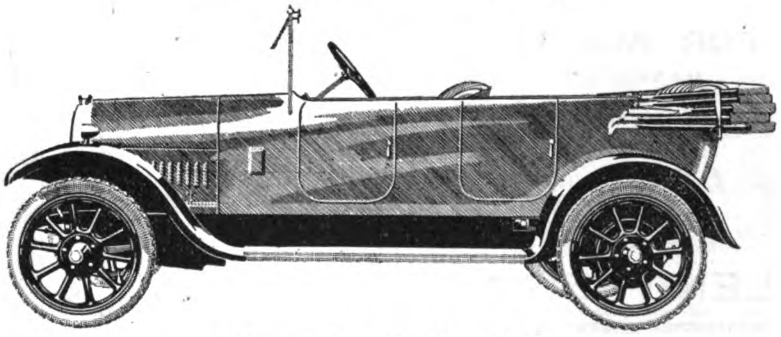
LONDON.

DISCRIMINATION

AMONGST discriminating motorists the Humber is known the world over. Humber is a pioneer name and to-day stands for all that is luxurious and best in car construction. Motoring experts are unanimous in their opinions of the many sterling qualities of the Handsome Humber range.

All Humber Cars are fitted with detachable steel Artillery Wheels suitable for all climates. All open models are fitted with the Humber All-weather Hood (with side curtains opening with the doors) which provides for complete protection even in tropical rains.

Write to-day for our Art Catalogue



11.4 h.p. All-weather Four-Seater

Provisional Balance Sheet, 1921 :

Income : Passengers, 316,826.58 ; Goods, 250,515.54 ; Others, 17,143.48 ; Value of stock, December 31, 1921, 298,384.73 ; Balance, 45,277-.98 ; Total, 928,148.31.

Expenditures : General charges, 111,448.56 ; Traffic, 80,662.08 ; Running, 490,952.67 ; Value of stock, January 1, 1921, 245,085 ; Total, 928,148.31.

Net Revenue Account : Balance from income and expenditure account, 45,277.98 ; Interest on capital, 19,589.61 ; Depreciation, 67,228.02 ; Net loss, 132,095.61.

CENTRAL PREANGER MOTOR SERVICE

Manager's Residence, Tjimahi :

No. of kilometres run by goods motors Fl.112,239

No. of kilometres run by passenger motors 50,286

Receipts, 1920, 74,226 ; 1921, 118,357.

Expenditures : General charges, 5,945 ; Traffic, 12,799 ; Running, 11,242 ; Maintenance and repairs, 16,599 ; Others, 46,324 ; Total, 92,-909 ; In 1920, 77,901.

Capital Account :	Balance from 1920	Fl. 127,640.66
	Additions in 1921	99,530.45
		227,171.11
	Depreciation, 1921	17,031.56
	Bal., Dec. 31, 1921	210,139.55

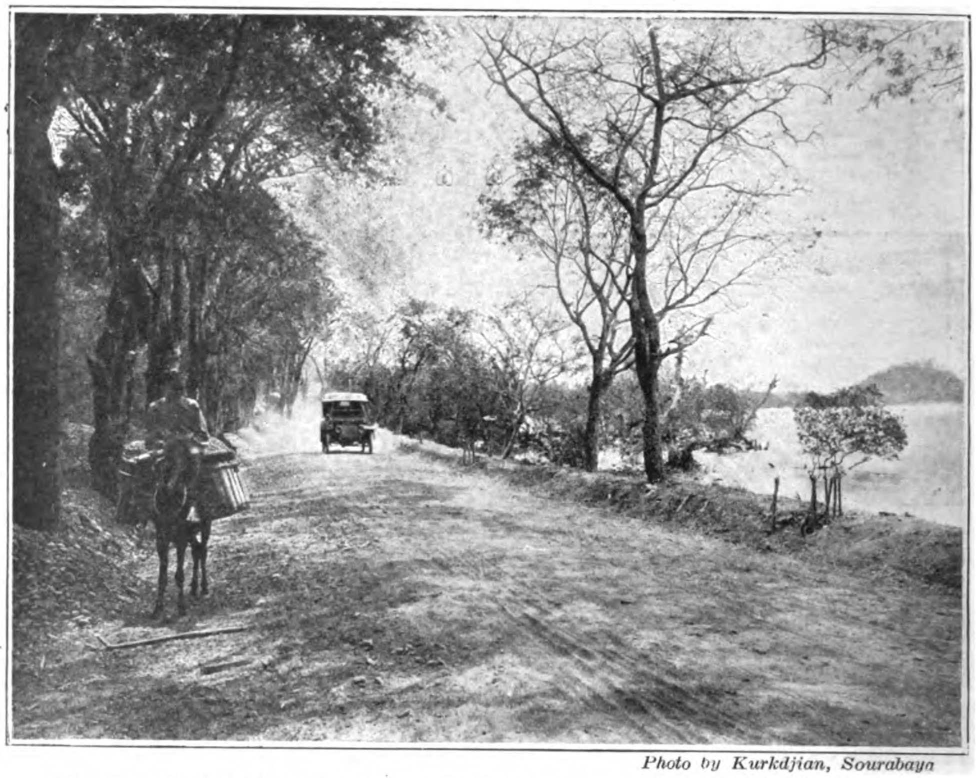


Photo by Kurkdjian, Sourabaya

Motor road along the North Coast of Java. Notice the way in which telegraph poles are made unnecessary

Provisional Balance Sheet, 1921 :

Income : Passengers, 64,910.00 ; Goods, 52,215.50 ; Others, 1,231.50 ; Value of stock, December 31, 1921, 10,832.11.

Expenditures : General charges, 28,678.60 ; Traffic, 12,798.95; Running, 59,207.05 ; Value of stock, January 1, 1921, 19,118 ; Balance, 9,386.51.

Net Revenue Account : Interest on capital, 8,870.29 ; Depreciation, 17,031.56 ; Balance from income and exp. account, 16,515.34 ; Net loss, 16,515.34.

CHERIBON MOTOR SERVICE

Manager's Residence, Koeningan :

No. of kilometres run by goods motors . .. Fl.224.487

No. of kilometres run by passenger motors .. 73,341

Receipts : 1920, Fl. 102,561 ; 1921, 124,115.

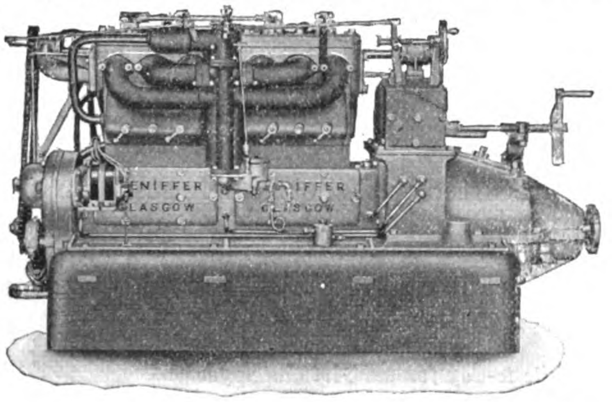
Expenditures : General charges, 7,797 ; Traffic, 15,566 ; Running, 17,676 ; Maintenance and repairs, 30,505 ; Others, 70,027 ; Renewals, 508 ; Total, 142,079 ; Loss, 17,964.

This loss is attributed to the competition with several private services operating on the Cheribon-Koeningan run.

Capital Account :

Balance from 1920	Fl. 159,422.94
Additions in 1921	5,644.07
	165,067.01
Depreciation, 1921	34,822.62
Balance, Dec. 31, 1921 ..	130,244.39

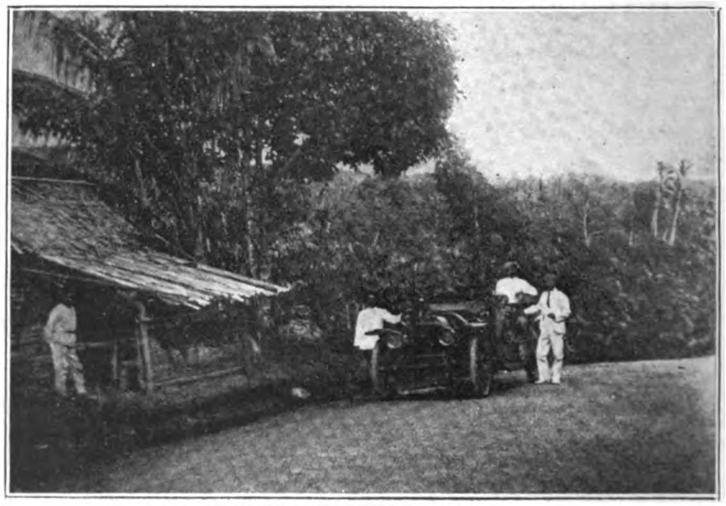
GLENIFFER
KEROSENE & PETROL MARINE MOTORS



FOR ALL TYPES OF BOATS
RANGE OF MODELS—10 TO 90 H.P.

AGENTS:—Douglas and Grant Ltd.—at Madras, Rangoon, Bangkok, Saigon, and Haiphong.
Ritchie and Bisset—at Singapore.
British and Dutch Engineering Co., Ltd.—at Batavia and Soerabaia.

GLENIFFER MOTORS LTD.
ANNIESLAND, GLASGOW, SCOTLAND.
TELEGRAMS: "GLENGINE, GLASGOW."



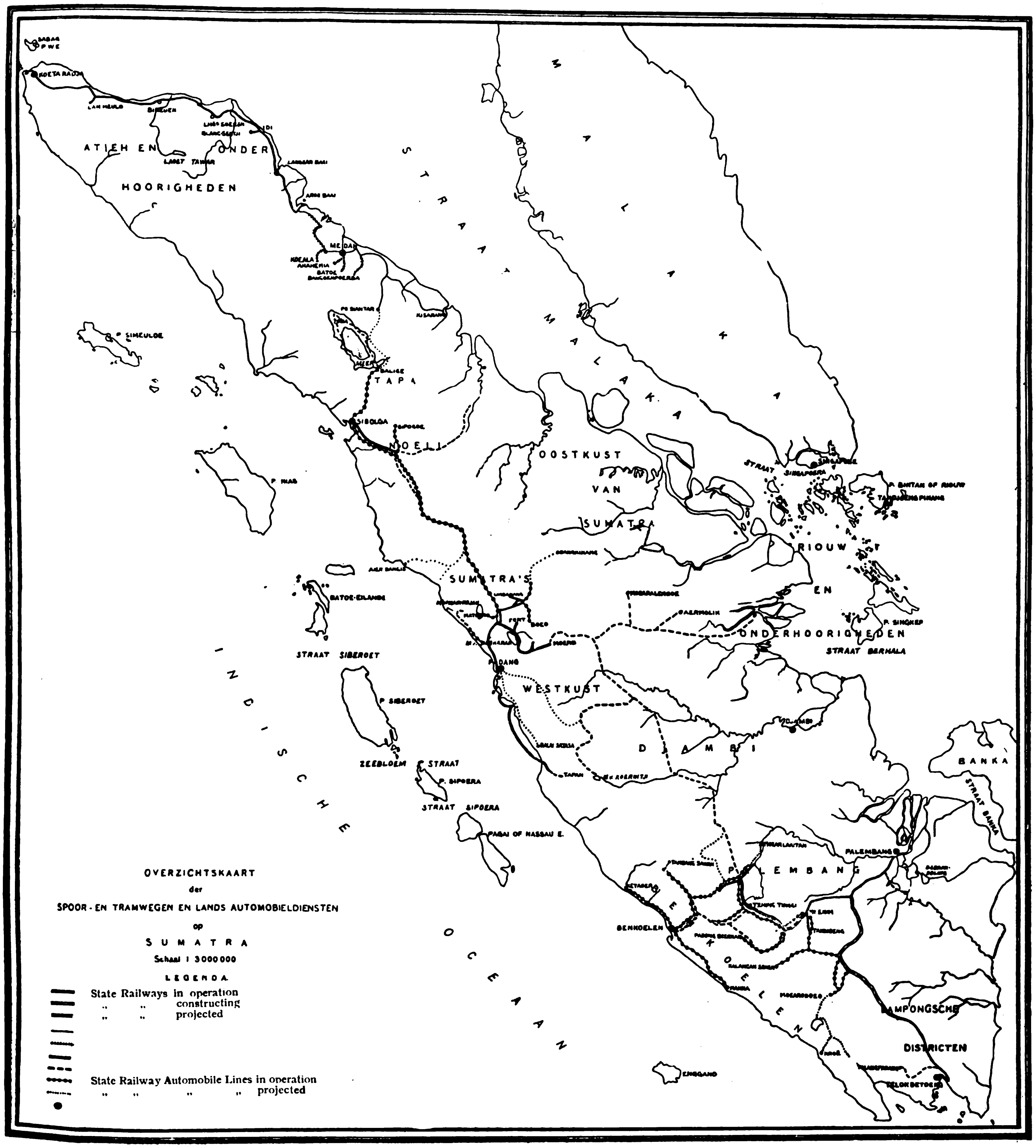
A Road in Menado, Celebes

Provisional Balance Sheet, 1921 :

Income: Passengers, 114,093.15 ; Goods, 9,015.50 ; Others, 1,006.25 ; Value of stock, December 31, 1921, 33,611.96 ; Balance, 45,013.55 ; Total, 202,740.41.

Expenditures: General charges, 33,062.80 ; Traffic, 15,566.08 ; Running, 104,576.53 ; Value of stock, January 1, 1921, 49,535 ; Total, 202,740.41.

Net Revenue Account: Balance from income and exp. account, 45,013.55 ; Interest on capital, 8,112.25 ; Depreciation, 34,822.62 ; Net loss, 87,948.42.

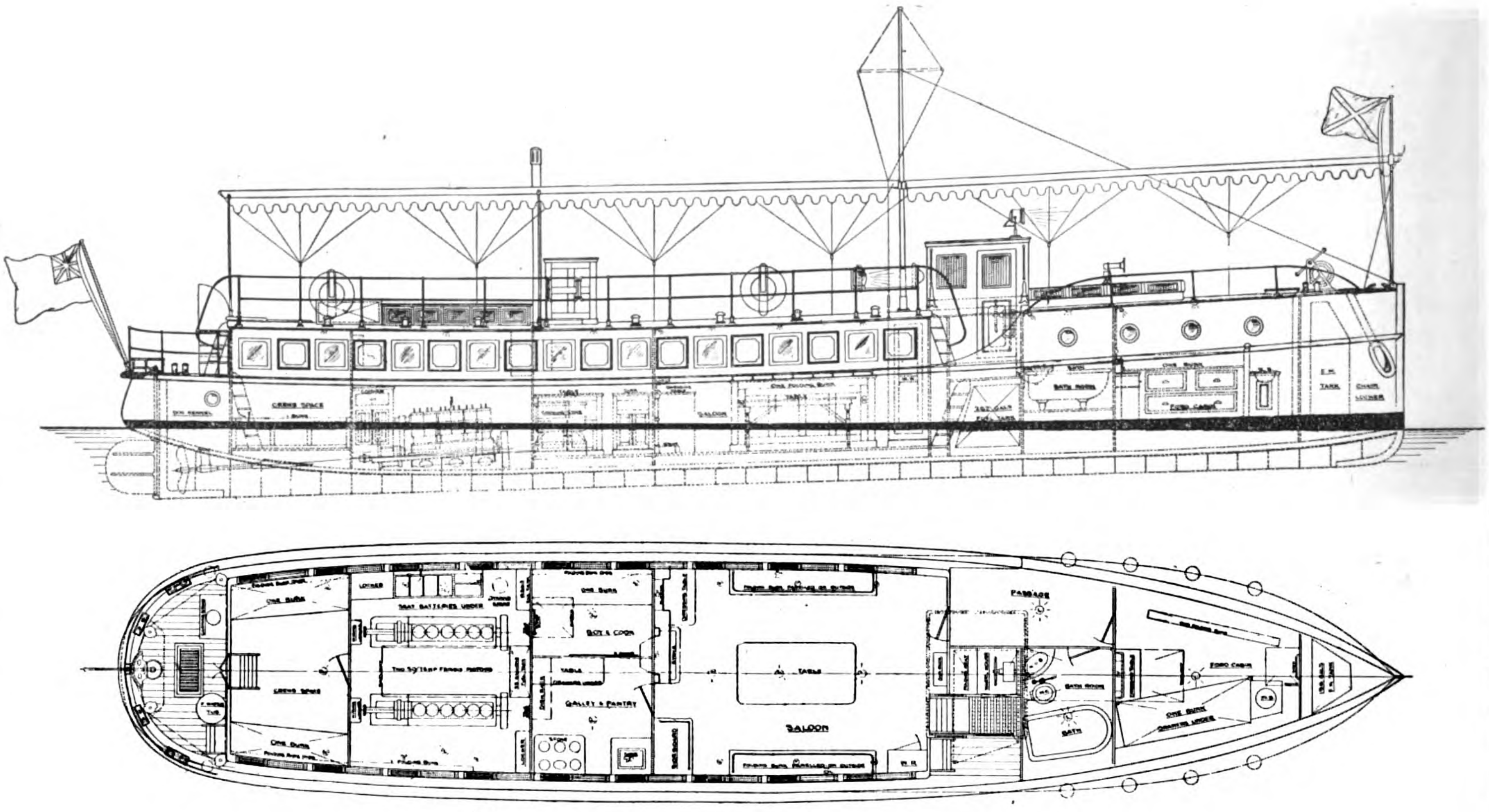


MAP SHOWING COMMUNICATIONS IN SUMATRA

JARDINE, MATHESON & CO., LTD.

Builders of steel and wooden craft of any draft to suit inland waterways and harbor service.

First-class workmanship and material guaranteed
Motors and complete launches in stock.



AGENTS FOR—

CRUDE OIL
WM. BEARDMORE & CO., LTD.
Heavy Duty Engines from 10-600 B.H.P.

KEROSENE
GLENIFFER MOTORS, LTD.
Kerosene Motors from 10-90 B.H.P.

BRITAIN'S BEST IN MARINE ENGINES

WORKS—POOTUNG:
OPPOSITE THE BUND

TELEPHONE C. 241

OFFICE:
8A YUEN-MING-YUEN ROAD

SHANGHAI

SOCONY AUTO OILS

Are manufactured for a simple purpose . . . to lubricate automobile engines. The rich lubricating qualities of our oils afford perfect lubrication to the wearing parts. Not only is this true in summer, it is equally true in Midwinter.

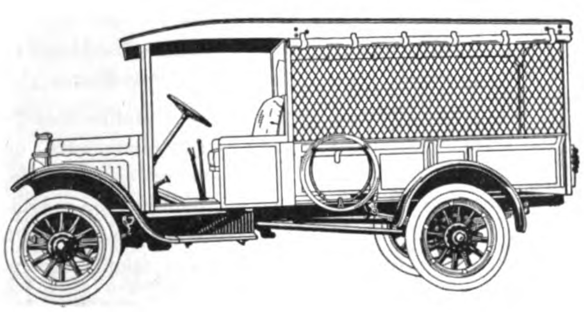
We have four grades of Auto Oils to meet every condition and requirement of the motorist.

Auto X Light
" XX Medium
" XXX Heavy
" XXX E. V. Extra Heavy

Obtainable at any Garage in China

UNEQUALLED SERVICE TO THE USER

REPUBLIC



The Republic Light Delivery Van supplies the long felt want for a reliable, speedy means of delivering merchandise over a wide district.

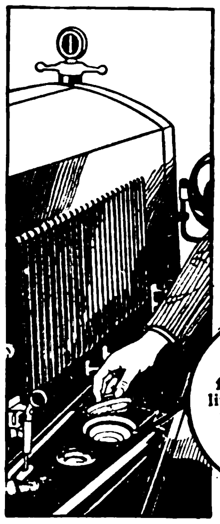
This finely constructed vehicle is fitted with pneumatic tyres; its sturdily built chassis assures long life and freedom from breakdown. Specially built for delivery service, both in first cost and operating expense, it is the most economical vehicle of its type.

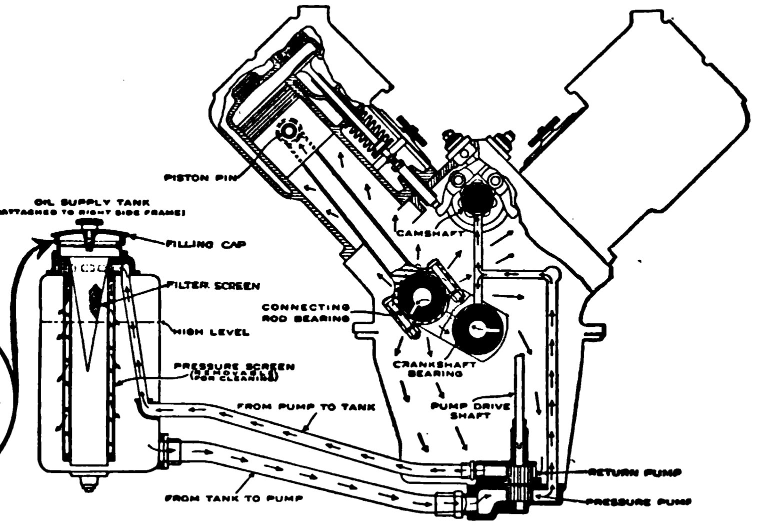
Republic Trucks are also built for heavy loads and for every industry—whatever your need in commercial vehicles may be, there is a Republic Truck to meet that purpose.

Central Garage Co., Ltd.,
2a Jinkee Road,
Shanghai

REPUBLIC TRUCK SALES CORPORATION,
Alma, Michigan, U.S.A.
Cable Address : REPUBLIC

AIRPLANE LUBRICATION FOR AUTOS





Oil tank apart from crank case, filled without lifting hood. Left view shows position of filler cap and gauge.

MUCH interest has been evidenced in motor car circles and among car owners in the new airplane system of motor lubrication. It has proved amazingly efficient, the average mileage yield per quart of oil being well above 500 miles. It also has borne out the claims of its sponsors that it greatly reduces wear and tear on moving parts, thereby adding materially to the life of the motor.

Engineers of The Standard Motor Car Company, Pittsburgh, are the first to apply the airplane system to the automobile. On the Standard Eight the oil is carried apart from the crank-case in a three-gallon container anchored to the frame under the right front fender. Oil flows by gravity through a flexible tube to the crankcase, whence it is pumped upward to cylinders, bearings, rods and all other moving parts.

It then drops to the base of the engine and is pumped back into the container, being cooled and re-filtered before again making its circuit through the motor. On a recent test run from Pittsburgh to New York, less than a quart of oil was consumed. Temperature readings after climbing and descending the redoubtable Tuscarora Ridge of the Alleghany mountains showed no appreciable increase in oil heat.

This system is based on that developed during the war by allied engineers who produced it to increase the efficiency of battle planes. In the early stages of the war countless plane bearings burned out, for in a quick descent rear bearings were starved, while forward ones were flooded. On a steep climb front bearings were almost unlubricated while rear ones were inundated. Spark plugs fouled. Carbon deposits were heavy.

By carrying the oil in a separate container and forcing it to all moving parts, regardless of the pitch of flying, these evils were overcome. In the automobile it is almost as important an improvement as in the airplane In steep climbs or quick descents oil is pumped uniformly to all parts. There can be no starved bearings nor flooded ones, nor fouled spark plugs.

It is believed that airplane lubrication of the motor car is among the most notable of automobile achievements in recent years. It has proved equally efficient in summer and zero temperature.

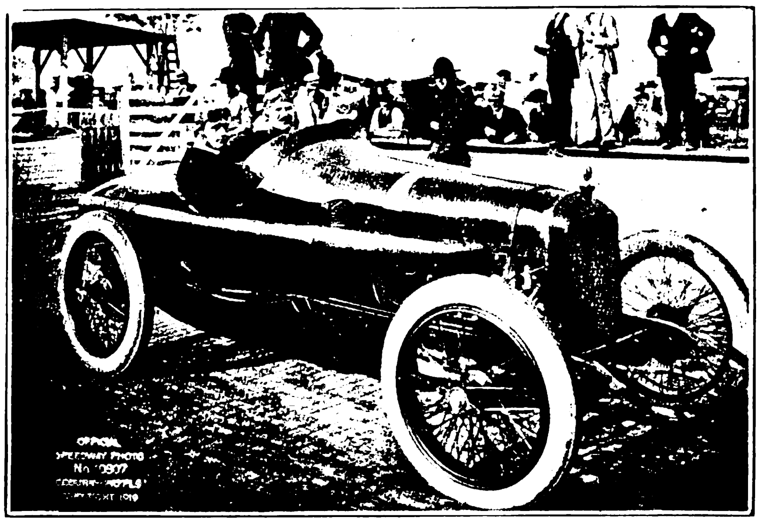
Graphite Transmission and Differential Grease No. 677

We are proud to state that No. 677 has justified the labor and expense devoted to a really intelligent effort to produce an ideal gear lubricant. It has successfully stood the test of years. There is nothing like it on the market. It is the grease the "Speed Kings" use.

No. 677 is graphited grease of medium density that flows over the gears like an oil, yet possesses the peculiar property of not settling when the gears are not in motion. It reaches all the bearings and provides a graphite coating that prevents wear, reduces friction and causes cool running at all times. No. 677 remains unchanged in hot or cold weather. It will last far longer than the best plain grease.

No. 677 is recommended for transmissions and differentials, except those designed for light oil lubrication. The consistency is about that of heavy gear oil. It is also the most satisfactory lubricant for electric gear shift mechanisms, the reverse gears of power boats, and for change-speed gear boxes of motorcycles.

Sold in one, five and ten pound tins. Larger packages if desired.



"Many times Dixon's Graphite Automobile Lubricants have pulled my car through a trying race without lubricating difficulty."—LOUIS CHEVROLET.

Joseph Dixon Crucible Co.

Established, 1827

For Prices, Information, etc., communicate with

HENRY KATTEN

22 KIUKIANG ROAD

SHANGHAI, CHINA

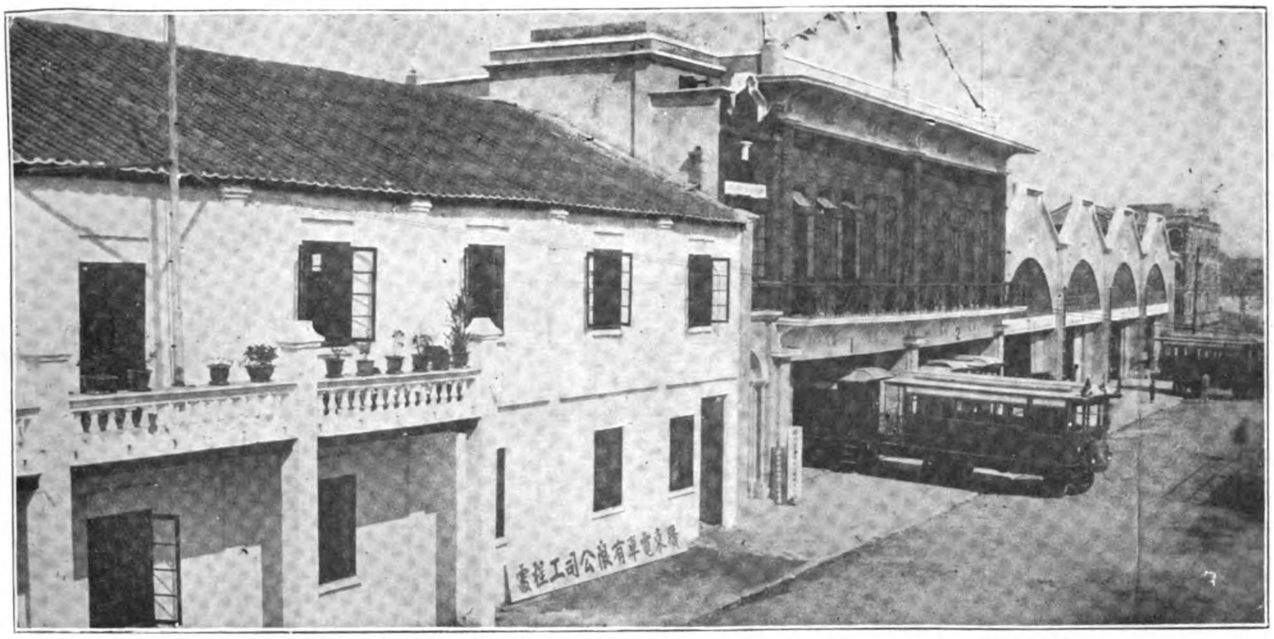
Graphite Cup Greases

Cup Greases containing fine flake graphite reduce friction to a minimum. By using these high-grade graphited greases, bearings soon acquire the well-known graphite polish that eliminates friction and causes easy running. Used in all grease cups, wheel spindles, etc.

Dixon's Graphite Cup Grease No. 3 is recommended, except in warm climates, where No. 5 is more suitable. The consistency of each grade changes but little under wide temperature variation.

The importance of attending to the numerous small bearings and moving parts of cars is frequently overlooked. Wherever you see a grease cup don't think it is put on as an ornament, but give it a turn once a day or once a week according to the requirements. Don't forget to keep the cups filled with grease.

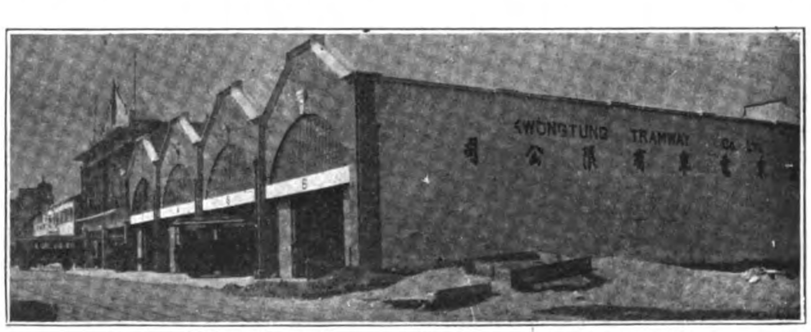
Sold in one, five and ten pound tins. Larger packages if desired.



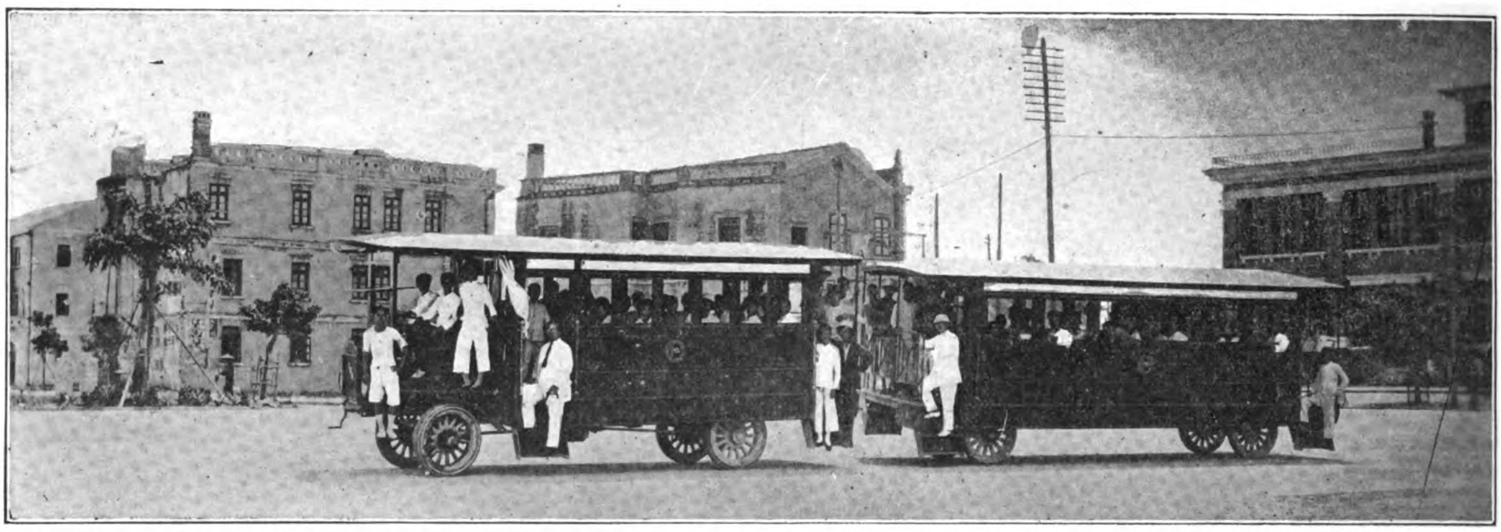
Offices, Car Barns and Engineering Department of the Kwangtung Tramway Co., Ltd. at Canton

The Kwangtung Tramway Co., Ltd.

EARLY in 1917, a Canadian promoter, T. R. E. MacInnes, appeared in Canton, and, obtaining an interview with the Governor, Chu Ching-lan, proposed to take down the ancient walls of the city, and cut a number of boulevards through the narrow streets, for the purpose of operating a tramway service. He was well entertained by the governor, who regarded the proposition very favorably. Mr. MacInnes was fortunate in associating with himself Mr. Peter Hing (Wu Tsic-pun) a clever and resourceful Chinese lawyer, trained in Canada, and the first Chinese graduate of McGill University. Political disturbances in Canton in 1917 prevented the scheme being carried out at the time. But two years later MacInnes returned to Canton, and continued his interrupted negotiations. In August, 1919, a concession was granted to him and his two associates, Messrs. Peter Hing and Sam Kee (Chan Choi) a well-known Chinese merchant of Vancouver, and naturalized Canadian citizen. By the concession an exclusive franchise was granted for a term of twenty years to operate any form of tramway service in Canton and suburbs anywhere within a radius of ten miles from the centre of the city. Forthwith a company was incorporated under name of the Kwangtung Tramway Company, and the concession was assigned to the company. Like the Wing On Company, the Sincere Company, the Sun Company, and other well-known Chinese mercantile organizations, the tramway company was incorporated under the laws of Hongkong as a Hongkong-China company, thereby having its affairs administered under wise regulations, and the interests of its shareholders properly protected. The company paid one million dollars Hongkong currency to the Canton government for the concession, and for that the company is free from taxation in any form, direct or indirect, during the term of the concession, or any renewal of it. The million dollars so paid was entirely expended in taking down the walls of the city, and constructing boulevards, or maloos, as they are locally known, developing a plan originally prepared by a Canadian engineer, P. W. W. Bell, who came to Canton at the suggestion of MacInnes in 1917. The company, in spite of many unusual difficulties, and civil strife in Canton, has forged ahead to success under the strong and experienced direction of Mr. Eng Hok-fong, a Chinese business man of Hongkong, who became president and managing director of the company. Mr. Eng Hok-fong is president also of the Mexico Steamship Company and the Eng Hok Fong Steamship Company, and has been a man of affairs in Mexico and California as well as China. With him, as directors of the tramway company, are associated Messrs. Ng Ye-hon, Yu Tao-sang, Chin Kwang-hing, Kwong Cheung-pao and Chung Tin-yow, all wealthy business men of Hongkong, and Messrs. Ma Chao-kum, Lau Siu-wan and Ng Cheu-kwan of Canton, and T. R. E. MacInnes of Vancouver. Mr. MacInnes is the only foreign member of the company, and he is temporarily residing in Canton to give what assistance he can to the company during present disturbed conditions. Mr. Peter Hing is the energetic local manager, and is ably assisted by Messrs. Fong Ukiah as sub-manager and Ng Lai-ting, traffic manager. The company in 1920 decided to operate motorbusses, after the fashion of London, and for that purpose purchased a number of F. W. D. trucks in the United States, building the bodies in Canton. At present, on the maloos which have been completed, the company operates twenty cars with fifteen trailers. The cars seat twenty-three first-class passengers, and the trailers forty-three second class. The company laid down several miles of specially concreted strips along the maloos on which to run its cars. It has been found, however, that the foundation is not sufficient, and the roads are in continual need of repair. So the company has now decided to lay down ten miles of double track grooved rails and run its motor cars thereon as is now economically done in the United States for short routes, and on over four hundred miles of the P. G. E. Government Railway of British Columbia. The first rails laid



Another View of Car Barns of the Kwangtung Tramway Co.



One of the F.D.W. Trucks and Trailers in use by the Kwangtung Tramway Company, starting out from the Tashatao Railway Station Terminus in Canton on the 150-foot wide Pak Wan Maloo (White Cloud Highway). These are three-ton trucks with power and brakes applied to all four wheels. This is claimed to add greatly to safety in handling, a most important feature when inaugurating a new service in a Chinese city where the prevailing sentiment is apt to be against any innovation in the old modes of transportation.

The F.W.D. trucks are designed so they can be converted into rail-cars by simply replacing the rubber tires with steel ones and locking the steering gear. As soon as the present trouble is over, the company intends to lay down steel tracks and when this is done it will only take a couple of hours work on each car and trailer to convert them for the rails. The work is under the direction of an experienced American engineer, Mr. Harvey L. Decker, who has had considerable experience in working these cars in India.

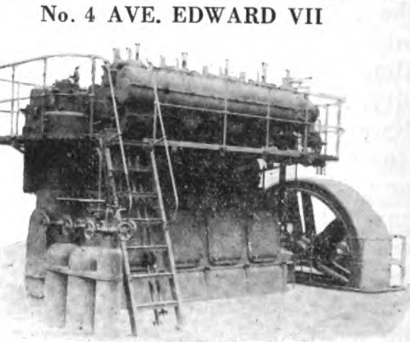
down will be from the Canton-Kowloon Railway Station (Tashatao) to the Canton-Hankow station (Yueh Han) a distance of four miles through the busiest section of the city. For this purpose the houses along Shakee, opposite the foreign island settlement of Shameen, were being demolished with the object of widening the fifteen-foot thoroughfare to a maloo of eighty feet when the conflict between Sun Yat-sen and Chen Chuing-ming put a temporary stop to the work. This disturbance, however, is looked upon by the company as no more than a passing storm, and it is confidently expected that the normal life of the city will be resumed before the summer is over. During the bombardment of Canton on the 17th of June last the company's buildings were struck by five shot, but fortunately they were solid shot and not shell, so not much damage was done, and none of the company's employees were hit, although at a teahouse within a hundred yards sixteen people were killed and many injured, and several were killed on adjacent streets. One shot coming through the wall crossed directly over the desk where Mr. MacInnes usually sits, but he had his head elsewhere at the time, else it would not be where it now is. Except when stopped by definite military orders the company continues to run its cars during the present trouble, even when the shops are all locked and barred. To see them going gives a certain amount of confidence to the citizens, and it helps to allay panic. The period of twenty years for which the concession was granted does not begin to run against the company until a certain minimum route of maloos has been completed by the city, and therefore the present time is so much added during which the company organizes its business and trains a loyal body of employees. The company has been fortunate in securing the services of Mr. Harvey Decker, an American motor expert, who has had wide experience in handling motor-trucks in tropical countries, including India and Java. Rails will be laid down of proper weight and fashion so that if in the future it be thought more profitable to build a power-plant and run electric cars no change need be made except to add overhead equipment. From the company's experience so far, however, it is thought the gasoline car on rails will be the most profitable form of tramway service. The mere fact that each car runs on its own power, and so cannot be stopped by an accident or strike at a central power station is in itself a guarantee of continuous service for the public which cannot be had otherwise, as proved by the tramway strike in Hongkong some years ago. The company considers its future bright. And it has the satisfaction of knowing that it is indeed the mother of the maloos, and that to its inception and operation is due the great impetus for municipal improvement which has been so marked during the past two years in Canton. Regarded at first with some suspicion and conservative hostility, especially by those landowners whose lands were curtailed to make way for the maloos, yet now it is cordially appreciated and supported by all classes in Canton. Land has increased ten times in value where the maloos run, the ricsha coolies now have over fifteen miles additional roads on which they can operate, and hitherto unthought of extensions of business and opportunities for employment have come as a result of the promotion of the tramway idea.

SULZER BROTHERS

SHANGHAI ENGINEERING OFFICE
No. 4 AVE. EDWARD VII

蘇爾壽
工業事務所
上海愛多亞路四號

目錄及關於工業上之問答等請直接本公司惟須指明經何進口行以便公司與之接洽一切也



200 H.P. Diesel Engine

Uniflow Steam Engines, Upright Watertube Boilers, High and Lowlift Centrifugal Pumps, Fans and Ventilators for all purposes, Fire Engines, STATIONARY DIESEL ENGINES, Direct Reversible Diesel Marine Engines, Ice and Refrigerating Plants, Central Heating, Electro-Boilers, Maag Gear Machines.

WINTERTHUR. SWITZERLAND.

Motor Transportation in the Philippines

ALTHOUGH the registration of automobiles in the Philippines increased from 8,341 to 9,738 and motor trucks, from 2,722 to 3,053, the general tendency was downward in both the passenger and tonnage movement for 1921. The Manila Electric Company reports a decrease in the passenger movement of 1,954,445 during the year. The Manila Railroad Company, however, reports an increase in tonnage movement of from 806,380 in 1920 to 1,051,551 in 1921, though the passenger movement decreased 2,326,804 for 1921. This reduction, however, is mostly due to the competition of automobiles and motor trucks operating between the city of Manila and near-by provinces.

During the year 1921, there was comparatively little road building done on the islands. Only 134 kilometres were added to the system. First-class roads were increased by 159.9 kilometres bringing the total up to 5,066.2; 7.3 kilometres were added to the second-class roads a total of 2,044.8 kilometres, while third-class roads show a decrease of 43.2 kilometres, a total of 3,036.6. The total lengths of roads in the islands is now 10,147.6 kilometres. During the year Pesos 4,546,284 was expended on maintenance and Pesos 8,180,413 on new bridges and roads, a total of Pesos 12,726.697.

The first-class roads are open the entire year for automobile traffic. These roads have permanent bridges and culverts or regular ferry service and are all hard surfaced. The second-class roads are suitable for all kinds of traffic only during the dry season. These are standard width roads but have many temporary bridges and culverts, mostly built of bamboo, many of which are washed out during the rainy season. These roads are partly ordinary dirt roads. Third-class roads are really cart tracks, although a light automobile can use them during the dry season.

There are 1,428 kilometres of roads surfaced with crushed stone: 3,210 kilometres surfaced with gravel: 1,460 kilometres surfaced with coral and 3,818 kilometres unsurfaced dirt roads. The crushed stone used is of several kinds, mostly sandstone and limestone. There are some very good coral roads, but the surface does not last long. An experimental concrete road was put down seven years ago, but it has become badly crushed and the engineers realize that this was caused by not having a proper base. It has been estimated that with a daily traffic of 500 vehicles on a macadam road that the annual upkeep is Pesos 1,000 per kilometre.

There are 7,461 bridges in the islands with a span of about 20 miles, of which about 4,400 are concrete and culverts with about 10 miles span.

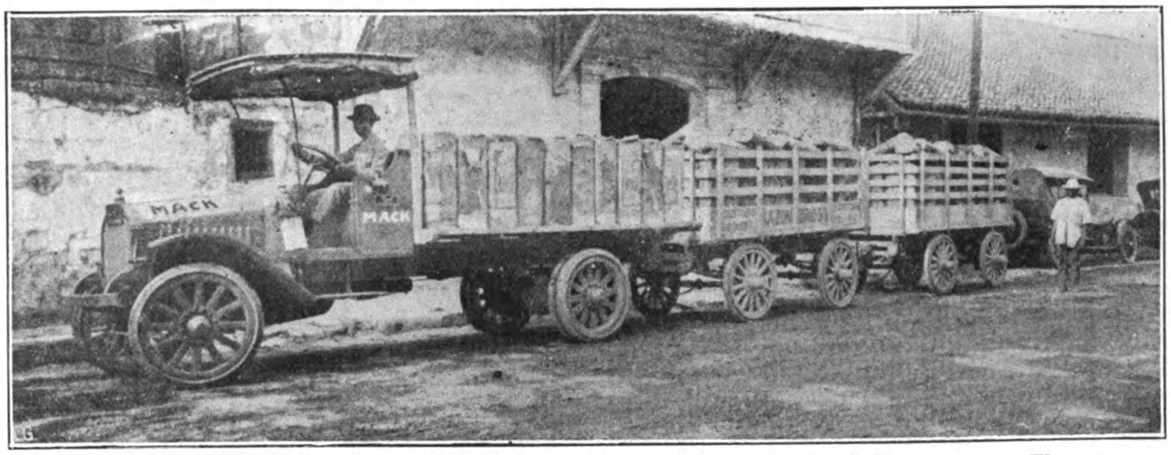
Of the 9,738 automobiles registered in the islands, 4,782 are in the city of Manila or about half of the total registered. This, however, does not include motor trucks, of which there are 3,053 registered, 1,280 being in Manila. There are 20 makes of motor cycles with a total registration of 1,093 scattered throughout the islands. The registration list of cars by makers for 1922, compiled by E. M. Mac Intosh of the Goodyear Tire and Rubber Co., shows the following distribution :—

AUTOMOBILES REGISTERED IN P. I. UP TO APRIL 1, 1922.

Make.	Private.	Hire.	Garage.	Gov'nt	Pub. Ut.	Total.	% of Total.
Dodge	1,281	353	87	80	34	1,835	23
Ford	1,058	433	19	137	35	1,682	21
Buick	737	167	21	3	10	938	12
Hupmobile... ...	445	60	1	26	17	549	7
Overland	361	68	14	3	10	456	5.5
Hudson	367	9	18	3	4	401	5
Chevrolet	135	152	10	1	5	303	4
Maxwell	233	27	26	—	2	288	3.5
Essex	188	3	1	—	1	193	2.5
Willys-Knight ...	137	7	26	1	1	172	2
Studebaker... ...	126	9	1	—	2	138	1.7
Cadiliac	85	3	—	6	—	94	1
Nash	84	5	5	—	—	94	1
Chandler	60	2	2	21	—	85	1
Oakland	56	9	1	1	—	67	1
Scripps-Booth ...	65	2	2	—	—	67	1
Oldsmobile... ...	59	—	1	—	—	60	0.7
Renault	57	—	—	—	—	57	0.7
Saxon	39	3	—	—	—	42	0.5
Paige	34	2	—	—	—	37	0.5
Case...	25	—	—	—	—	25	0.3
Peerless	24	1	—	—	—	25	0.3
Briscoe	21	—	—	—	1	22	0.3
Brazier	21	—	—	—	—	21	0.3
Cleveland	21	—	—	—	—	21	0.3
Franklin	18	—	—	—	—	18	0.2
Packard	14	—	—	2	—	16	0.2
White	4	—	—	10	—	14	0.2
Chalmers	12	1	—	—	1	14	0.2
Cole	12	—	—	—	—	12	0.15
Dort	8	2	1	—	—	11	0.15
Panhard	11	—	—	—	—	11	0.15
Reo	10	1	—	—	—	11	0.15
Stutz	10	—	—	—	—	10	0.15
Stearns Knight ...	10	—	—	—	—	10	0.15
King	8	1	—	—	—	9	0.1
Delahaye	9	—	—	—	—	9	0.1
Haynes	5	2	—	—	—	7	0.1
Willys Overland ...	6	—	—	1	—	7	0.1
Winton	7	—	—	—	—	7	0.1
Trumbull	6	—	—	—	—	6	—
Seneca	6	—	—	—	—	6	—
Pierce Arrow ...	5	—	—	1	—	6	—
Elgin	5	1	—	—	—	6	—
Austin	5	—	—	—	—	5	—
Commonwealth ...	5	—	—	—	—	5	—
Mercer	5	—	—	—	—	5	—
Premier	5	—	—	—	—	5	—
68 other makes ...	130	5	—	3	4	142	1.5
Totals	6,035	1,328	234	299	128	8,004	99.8

98.3 per cent. of all the cars in the P. I. are American makes and only 1.7 per cent. are European.

This list includes 128 passenger car chassis which have been equipped with buss bodies. These chassis have been registered as trucks and are therefore listed among the trucks on the accompanying list. Those include 35 Fords, 34 Dodges, 17 Hupmobiles, 10 Buicks, 10 Overlands, 5 Chevrolets, 4 Hudsons and 13 others.



Cargo Transportation in Manila. A Mack Truck pulling two 2-ton trailers loaded to capacity- There are 1,280 trucks in Manila

TRU'KS IN PHILIPPINE ISLANDS BY MAKES UP TO APRIL 1, 1922.

Make.	Private	Hire.	Garage.	Gov'nt.	Pub. Ut.	Total.	% of Total.
Ford	300	113	62	141	247	863	35
White	47	52	8	71	136	314	13
G. M. C.	36	14	25	47	45	167	7
Denby	47	12	9	1	32	121	5
Dodge	29	2	3	7	64	105	4
Packard	19	8	6	20	18	71	3
Clydesdale	23	6	10	—	17	56	2
Truck Trailers ...	23	3	7	3	7	53	2
Traffic	13	16	—	—	17	46	2
Maxwell	20	13	5	—	7	45	2
Bethlehem	9	29	1	—	6	45	2
Overland	17	3	3	—	19	42	2
Federal	11	9	2	9	10	41	2
Hupmobile... ...	9	—	2	1	23	35	1.5
Buick	9	4	—	—	18	31	1
G. V. C.	—	—	—	30	—	30	1
Troy	23	—	1	1	4	29	1
Garford	12	8	3	—	6	29	1
Delahaye	14	1	10	—	1	26	1
F. W. D.	—	2	—	19	—	21	1
Hudson	6	3	2	—	5	16	0.5
Autocar	11	—	4	—	—	15	0.5
All American ...	4	2	—	—	6	12	0.5
Gramm	4	6	1	2	—	13	0.5
Studebaker... ...	4	2	—	—	5	11	0.5
Mack	3	5	—	—	2	10	0.5
Chevrolet	3	—	—	—	7	10	0.5
Alco...	—	1	—	8	—	9	0.5
Gen. Vehicle ...	9	—	—	—	—	9	0.5
Oldsmobile... ...	2	—	2	—	5	9	0.5
Chalmers	2	1	—	—	4	7	0.5
De Dion Bouton ...	—	—	—	3	3	6	0.5
Reo	3	1	—	1	1	6	0.5
U. S.	3	—	1	—	1	5	—
Renault	3	2	—	—	—	5	—
Peerless	—	—	1	1	3	5	—
Mitchell	2	2	—	—	1	5	—
Doane	3	2	—	—	—	5	—
Dearborn	3	—	—	—	2	5	—
Christie	—	—	—	5	—	5	—
Berliet	1	—	3	1	—	5	—
American La France	—	—	—	5	—	5	—
Day Elder	2	2	—	—	—	4	—
Indiana	—	4	—	—	—	4	—
Liberty	—	—	—	4	—	4	—
Sanford	2	2	—	—	—	4	—
Service	2	1	1	—	—	4	—
St. B.	—	—	—	4	—	4	—
Jeffery	2	—	—	—	1	3	—
International ...	—	—	—	—	3	3	—
Commercial ...	—	—	—	3	—	3	—
Brasier	2	1	—	—	—	3	—
Winther	1	—	—	2	—	3	—
Warner	—	3	—	—	—	3	—
Opel...	3	—	—	—	—	3	—
Garner	2	—	—	1	—	3	—
40 Other makes ...	—	—	—	—	—	59	—
Totals	774	357	178	407	739	2,455	

The following table shows the number of motor cycles registered in the Philippine Islands up to April 1st, 1922 :—

Make.	Private-Owned.	Government.	Total.	%
Harley Davidson ...	176	188	364	45
Indian...	209	31	240	29
Cleveland	45	2	47	5.5
Excelsoir	44	—	44	5.5
Smith Bicycle Wheel .	32	8	40	5
Dayton	23	2	25	3
Henderson	22	—	22	3
F. N.	8	—	8	1
Briggs	4	—	4	0.5
Pope	4	—	4	0.5
All Others	11	—	11	2
Total	578	231	809	100

42 per cent. of all motor cycles are in Manila and the remainder scattered over the provinces.

51 per cent. of all applicants for license applied for 1 passenger.

38 per cent. of all applicants for license applied for 2 passenger.

11 per cent. of all applicants for license applied for 3 passenger.

There is no record of the number with side cars but the best available authority shows about 40 per cent. of all motor cycles have side cars.

PHILIPPINE ISLAND CAR REGISTRATION FOR APRIL, MAY AND JUNE, 1922.

Registration for 2nd quarter in 1922, April, May and June show the following new cars registered :—

Make of Car.	Registered by: Private Owners	Hire Cars	Gov.	Total New Registration	% of Total
Ford	40	9	1	50	20
Dodge	40	4	2	47	19
Buick	17	2	—	19	7.5
Overland	14	2	—	16	6.5
Studebaker... ...	14	—	—	14	5.5
Chevrolet	11	3	—	14	5.5
Essex	12	—	—	12	5
Willys-Knight ...	12	—	—	12	5
Cleveland	9	—	—	9	3.5
Hudson	4	—	—	4	1.5
Chandler	4	—	—	4	1.5
Scripps Booth ...	4	—	—	4	1.5
Hupmobile ...	4	—	—	4	1.5
Nash	4	—	—	4	1.5
Oakland	3	1	—	4	1.5
Cadillac	3	—	1	4	1.5
Packard	3	—	—	3	1
Maxwell	3	—	—	3	1
Oakland	3	—	—	3	1
Haynes	3	—	—	3	1
Cole	2	—	—	2	1
Stephens	2	—	—	2	1
Briscoe	2	—	—	2	1
14 others	14	—	—	14	3
Total	227	21	4	253	100

PHILIPPINE ISLANDS MOTOR CYCLE REGISTRATIONS FOR APRIL MAY AND JUNE, 1922.

Registration for motor cycles for April, May and June, 1922, in the Philippine Islands are as follows :—

Make of M. C.	Registered by: Private Owners	Gov.	Total New Registration	% of Total
Harley D.	7	29	36	61
Indian	10	1	11	19
Cleveland	4	1	5	8.5
Henderson	2	—	2	3.5
Shaw	2	—	2	3.5
Opel	2	—	2	3.5
Excelsior	1	—	1	1
Total	28	31	59	100

PHILIPPINE ISLANDS TRUCKS REGISTRATION FOR APRIL, MAY AND JUNE, 1922.

Registration for new trucks for April, May and June, 1922, in the Philippine Islands are as follows :—

Make of Truck.	Registered by: Private Owners	Hire Trucks	Gov. Trucks	Total New Registration	% of Total
Ford 1 ton	7	2	3	12	30
Garford	2	1	5	8	20
White	—	2	4	6	14
G. M. C.	—	2	1	3	7
Standard	—	—	2	2	5
Day. Elder ...	—	2	—	2	5
Denby	—	1	—	1	2.5
Federal	—	1	—	1	2.5
U. S.	—	1	—	1	2.5
Bethlehem	—	1	—	1	2.5
Packard	1	—	—	1	2.5
Mohawk	1	—	—	1	2.5
Dodge	1	—	—	1	2.5
Arcadia	1	—	—	1	2.5
Total	13	13	15	41	101

Hotel PENNSYLVANIA

NEW YORK

THE LARGEST HOTEL IN THE WORLD

2,200 Bedrooms—each with a private Bathroom

The New York Hotel That Offers You Helpful Courtesy

If you are coming to New York for the first time, you naturally desire a hotel that will be not only luxurious but helpful. Within the Pennsylvania you will find not only comfort, and repose, but courteous attention to your welfare—and the Pennsylvania is convenient *to* everything, *for* everything.

How to Reserve Accommodation

Full information and descriptive literature can be obtained, and bookings can be arranged, through any of the offices of Messrs. Thos. Cook & Son; or, if you prefer, you can write or cable direct to whichever of the five hotels you will visit first. That hotel will give you an introduction to the others, and make your reservations.

All the Statler-operated hotels give especial attention to travelers from overseas.

Statler Hotel in BUFFALO
450 Bedrooms, each with a private Bathroom

Statler Hotel in CLEVELAND
1,000 Bedrooms, each with a private Bathroom

Statler Hotel in DETROIT
1,000 Bedrooms, each with a private Bathroom

Statler Hotel in ST. LOUIS
650 Bedrooms, each with a private Bathroom

HOTEL PENNSYLVANIA—NEW YORK CITY, U. S. A. Cables: "Pennhotel New York"

NIPPON MENKWA
KABUSHIKI KAISHA

(THE JAPAN COTTON TRADING CO., LTD.)

LARGEST IMPORTERS AND EXPORTERS
IN THE FAR EAST

COTTON
COTTON YARN
COTTON PIECE GOODS
RAW SILK
WOOL
GENERAL COMMISSION MERCHANTS

Established 1892

HEAD OFFICE: No. 10 2-Chome, Nakanoshima, OSAKA, JAPAN
SHANGHAI OFFICE: 8 Hankow Road
TIENTSIN OFFICE: 42 Rue de France, French Concession

Capital Subscribed- - - - - - - - - - - -	Yen 50,000,000.00
Capital paid-up - - - - - - - - - - - -	Yen 20,250,000.00
Reserve Funds - - - - - - - - - - - -	Yen 26,825,000.00

MATAZO KITA, Esq., *President*
ATUSHI YAMADA, Esq., *Vice-President*

Directors :

K. SUYEYOSHI, Esq.
H. OHOKA, Esq.
G. IMAMURA, Esq.
T. SHIKATA, Esq.
T. YASUI, Esq.
R. NAKAMURA, Esq.
K. KUSUMOTO, Esq.

BRANCHES: Semba (Local), Dairen, Shanghai, Hankow and Bombay

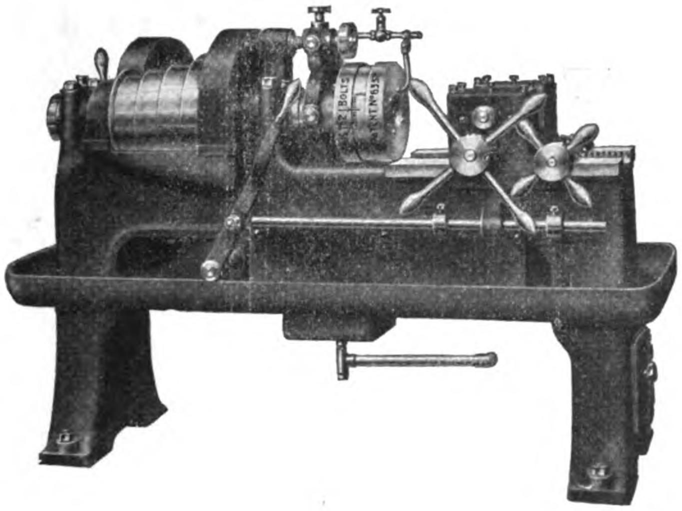
AGENCIES: Kobe, Yokohama, Tokyo, Seito, Tientsin, Newchwang, Tiehling, Changchung, Harbin, Hongkong, Calcutta, Karachi, Rangoon, Alexandria, Liverpool, New York and Buenos Aires

SOLE BUYING AGENCY IN U.S.A.: Japan Cotton Trading Company of Texas, Fort Worth, Texas

SOLE BUYING AGENCY IN COREA: Corea Cotton Trading Company, Limited

FACTORIES: Cotton Press at Hankow, Cotton Gins and Presses in India

Heap's Patent Screwing Machines



are made in all sizes, and suitable for dealing with all classes of work.

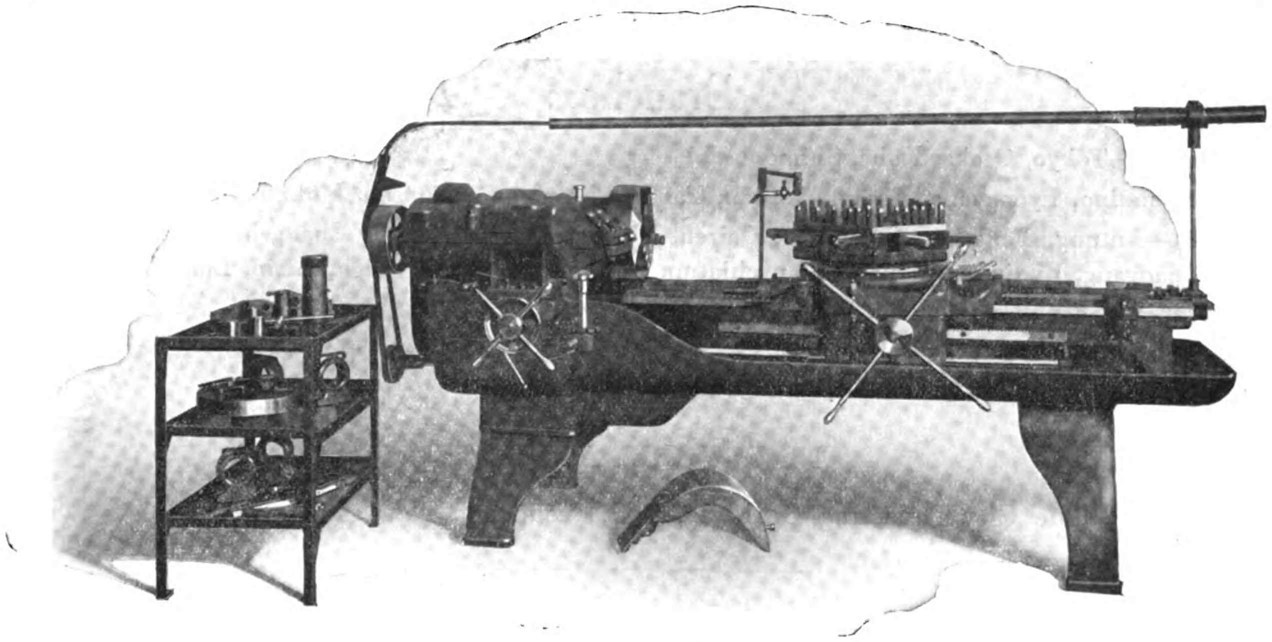
The illustration opposite shows our 2in. Patent Automatic Bolt Screwing Machine which is one of a complete line of Single and Multiple Head Machines specially designed for use wherever large quantities of Bolts have to be dealt with in the most expeditious and economical manner.

We will gladly advise you as to the most suitable machine for your particular class of work.

Catalogue free on request.

JOSHUA HEAP & CO., LTD.,

ASHTON-UNDER-LYNE, ENGLAND.



THE BEST KNOWN MACHINE IN THE WORLD

for bar and chuck work of medium size is the Hartness Flat Turret Lathe. It was the first to invade the shaft turning field of the engine lathe, and it remains the first in reputation and accomplishment.

It was the first to apply rigid construction and efficient speed and feed manipulation to chucking work, and here also it remains first in reputation and accomplishment.

On both bar and chucking work it performs the maximum of work with the minimum of capital expense for machining and tools. It is the unrivalled dividend producer.

JONES & LAMSON MACHINE COMPANY,

9-10 Water Lane, London, E.C., England.
Cable Address: "Turretorum" London

Springfield, Vermont, U.S.A.
Cable Address: "Turret" Springfield, Vt.

THE BANK OF CHOSEN

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor : S. Minobe, Esq.
Deputy-Governor : T. Kano, Esq.

Directors :

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT : TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY :

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE :

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL - - - - - - - U.S. $5,000,000

SURPLUS AND UNDIVIDED PROFITS - - 10,424,763

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK

LONDON OFFICE: 36 BISHOPSGATE, E.C.

LYONS OFFICE: 27 PLACE TOLOZAN

SAN FRANCISCO OFFICE: 232 MONTGOMERY STREET

BRANCHES:

CHINA
- SHANGHAI
- PEKING
- TIENTSIN
- HANKOW
- HARBIN
- HONGKONG
- CANTON

DOMINICA
- SANTO DOMINGO
- SANCHEZ
- SAN FRANCISCO
- SAN PEDRO
- SANTIAGO
- PUERTO PLATA
- BARAHONA
- LA VEGA

INDIA
- BOMBAY
- CALCUTTA
- RANGOON

JAPAN
- YOKOHAMA
- KOBE

JAVA
- BATAVIA
- SOURABAYA

PANAMA
- PANAMA
- COLON

PHILIPPINES
- MANILA
- CEBU

SPAIN
- BARCELONA
- MADRID

STRAITS SETTLEMENTS
- SINGAPORE

We are also able to offer our Customers the services of the Branches of the National City Bank of New York in the principal countries of South America, Central America and in the West Indies.

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current Accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

H. C. GULLAND, *Manager.*

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital ... ... **Frs. 72,000,000**
Reserves ... ... **„ 70,000,000**

HEAD OFFICE: 96 BOULEVARD HAUSSMANN, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Nouméa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

JUGO GINKO, LIMITED

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugo Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-up Y. 49,750,000 Reserve Funds Y. 23,900,000

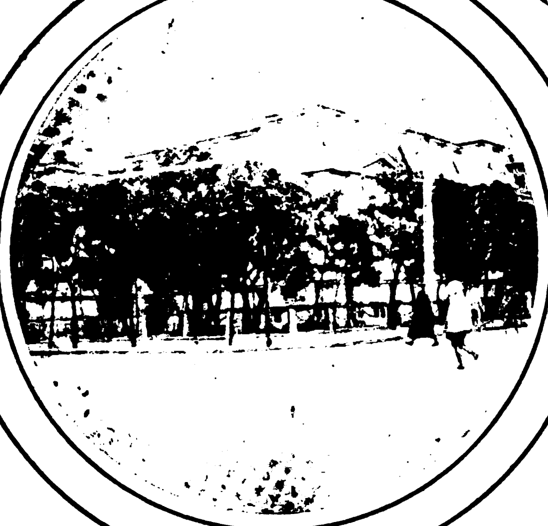
***President*: The Hon. Iwao Matsukata *Vice-President*: Masayasu Naruse, Esq.**
***Managing Directors*: Yutsuha Sato, Esq. and Kanesato Aiko, Esq.**
***Head Office Manager*: Sei Usagawa, Esq.**
***Head Office*: No. 6, 7chome, Kobiki-cho, Kyobashiku, Tokyo.**

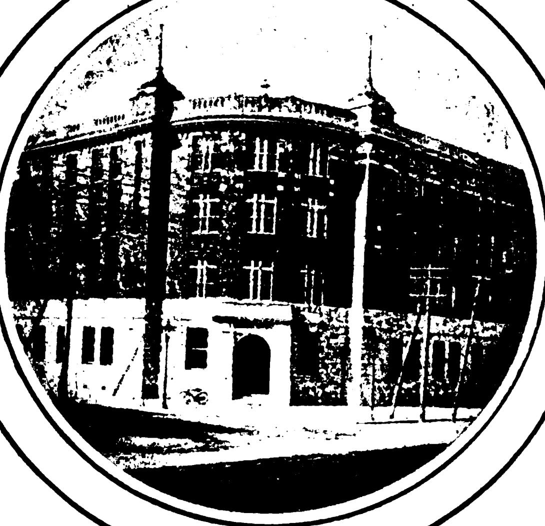
BRANCHES:

SHIMBASHI, MARUNOUCHI, GOFUKUBASHI, TOHORISANCHOME, KAKIGARACHO, NINGYOCHO, RYOGOKU, FUKAGAWA, KANDA (TOKYO). OSAKA, SENBA, TAMATSUKURI, NISHI, KUJO, MINAMI, NAMBA, TENNOJI, KITA, TENGACHAYA (OSAKA), KOBE, SAKAEMACHI, FUKIAI, HYOGO (KOBE). KYOTO, NAGOYA, SAKAI, WAKAYAMA, NISHINOMIYA. OKAYAMA, HIROSHIMA, SHIMONOSEKI, FUKUOKA, KUMAMOTO, KAGOSHIMA, SENDAI.

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD. LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD.
UNION DISCOUNT CO. OF LONDON, LTD.





THE

BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - - -	Yen 60,000,000
Capital Paid-up - - - - - - -	,, 45,000,000
Reserve Funds - - - - - - -	,, 9,680,000

President: KOJURO NAKAGAWA, Esq. Vice-President: SHUNROKURO MORI, Esq.

DIRECTORS:

TSUNEKICHI IKEDA, Esq. KUMEMATSU MORINAGA, Esq.
GUNJI KAWASAKI, Esq. MASUMI ESAKI, Esq.
TADASU HISAMUNE, Esq.

Head Office: TAIPEH, FORMOSA (TAIWAN)

BRANCHES:

JAPAN: Tokio (General Affairs Department), Kobe, Moji, Osaka, Yokohama.
TAIWAN: Keelung, Tainan, Takow, and 11 other points.
CHINA: Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

AGENTS AND CORRESPONDENTS:

In the Principal Cities and Towns throughout the World.

LONDON BANKERS:

BARCLAYS BANK, LTD. LLOYD'S BANK, LTD. LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.

TOKYO BRANCH:

No. 1, Eiraku-cho Ni-chome, Kojimachi-ku.

Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED - - - - - Yen 50,000,000
CAPITAL PAID-UP - - - - - - - Yen 45,000,000

HEAD OFFICE:
MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:
TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:
NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
KINICHI KAWAKAMI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

THE SUMITOMO GOSHI-KAISHA

OSAKA, JAPAN

OWNERS OF BESSHI COPPER MINE, COAL MINES, SILVER AND GOLD MINES, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper, Brass, Bronze and other Alloys, Solid and Drawn Steel Tubes, Nails, Etc.—Superphosphate and Composite, Manure, Sulphuric and Nitric Acid, etc.

GENERAL WAREHOUSE AND BANKING BUSINESS

WORKS AND DEPARTMENTS

Warehouses ... ... Osaka, Kobe & Tokyo
Mining Offices ... ... Besshi, Wakamatsu, Sapporo & Ohgayu
WORKS:
Copper Works ... ... Osaka & Amagasaki
Fertilizer Works ... ... Niihama
Sales Departments .. .. Osaka, Kobe, Tokyo, Kure, Yokosuka, Hakata, Shanghai, Hankow and Tientsin

THE SUMITOMO STEEL WORKS, LTD.

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of Every Description for Railways, Shipbuilding Yards, Mines, Hydraulic Electric and Other Engineering Works, etc., etc.

THE SUMITOMO ELECTRIC WIRE & CABLE WORKS, LIMITED

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Copper, Brass, Bronze and Nickel Wires and Strips, Trolley Wires, Insulated Wires and Cables of Every Description for Telephone, Telegraph, Lighting, Power Transmission, etc., etc.

THE SUMITOMO BANK, LIMITED

Head Office: OSAKA, JAPAN
Cable Address: "SUMITBANK"
President: Baron K. SUMITOMO
Established March, 1912
(Successors to The SUMITOMO BANK)

Capital Subscribed ... ... Yen 70,000,000
Capital Paid-up ... ... „ 50,000,000

Reserve Fund ... ... Yen 22,500,000
Deposits ... ... „ 369,000,000

Head Office: Kitahama, Osaka
City Offices: Semba, Bingomachi, Nakanoshima, Dotonbori, Kawaguchi, Tenma, Nipponbashi.
Home Branches: Tokyo (Tokyo, Toriaburacho, Fukagawa, Shinbashi, Asakusa), Yokohama, Nagoya, Kyoto (Kyoto and Nishijin), Kobe (Kobe and Hyogo), Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Wakamatsu, Kokura, Hakata and Kurume.

Foreign Branches: Shanghai, Hankow, Bombay, London, New York and San Francisco.
Agents: The Sumitomo Bank of Hawaii, Ltd., Honolulu, Lloyds Bank, Ltd., London, National City Bank of New York, New York.
Correspondents: In all important places at home and abroad.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

CHAIRMAN:

Mr. Manzo Kushida

MANAGING DIRECTORS:

Mr. Mikitaro Kikuchi Mr. Kiyoshi Sejimo
Mr. Takeo Kato

HEAD OFFICE:

No. 3 Yayesucho Nichome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

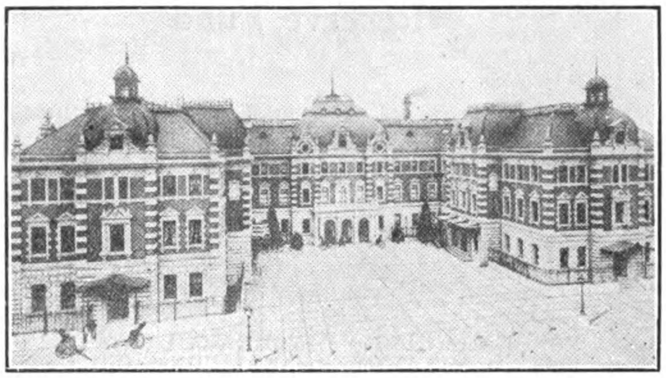
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Semba (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for the Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed... ....Y. 100,000,000.00
Capital Paid-Up......................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

NIHONBASHI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.
New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.
Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.
Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital - - -	**Yen 50,000,000.00**
Paid-Up Capital - - - -	**Yen 36,350,000.00**
Reserve Fund - - - -	**Yen 33,500,000.00**

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:

No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.

T. AKASHI, *Manager*

CITY BRANCHES:

ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:

YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:

SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:

The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE ONE HUNDREDTH BANK, LTD.

(DAI HYAKU GINKO)

HEAD OFFICE, AWOMONO-CHO, TOKYO

TOKYO BRANCHES: No. 1 Torihatagocho, Nihonbashi: No. 10, Ginza Nichome, Kyobashi
YOKOHAMA BRANCH: Nos. 53-55 Honcho Shichome
OSAKA BRANCH: 28 Bingo-machi, Nichome
KYOTO BRANCH: Shijo Higashinotoin
SHINMACHI BRANCH: Shinmachi Dori Sanchome

***President:* K. IKEDA, Esq.**

***Managing Director:* S. CHOH, Esq.**

SUBSCRIBED CAPITAL - - - -	Yen 25,000,000
CAPITAL PAID-UP - - - - -	Yen 17,500,000
RESERVE FUND - - - - -	Yen 8,094,340
DEPOSITS - - - - - - - -	Yen 110,740,264

Transacts General Banking and Foreign Exchange Business. Conducts Trust Company Business

Hongkong and Shanghai Banking Corporation

Paid-up Capital	...	$20,000,000
Reserve Funds:	Sterling ...	£4,500,000
	Silver ...	$23,500,000
Reserve Liability of Proprietors	...	$20,000,000

Court of Directors:

G. M. DODWELL, Esq., Chairman

Hon. Mr. A. O. LANG, Deputy Chairman

D. G. M. BERNARD, Esq.
G. T. M. EDKINS, Esq.
P. H. HOLYOAK, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
A. M. BOWES SMITH, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY	LONDON
BANGKOK	LYONS
BATAVIA	MALACCA
BOMBAY	MANILA
CALCUTTA	NAGASAKI
CANTON	NEW YORK
CHEFOO	PEKING
COLOMBO	PENANG
DAIREN	RANGOON
FOOCHOW	SAIGON
HAIPHONG	S. FRANCISCO
HAMBURG	SHANGHAI
HANKOW	SINGAPORE
HARBIN	SOURABAYA
ILOILO	SUNGEI PATANI
IPOH	TIENTSIN
JOHORE	TSINGTAO
KOBE	VLADIVOSTOCK
KUALA LUMPUR	YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

SOUTH AMERICA

HEAD OFFICE: MONTREAL, CANADA

We offer a complete banking service in the following countries, special attention being given to the handling of collections.

ARGENTINE	BRAZIL	URUGUAY
Buenos Aires (2 Branches).	Rio de Janeiro, Santos, Sao Paulo.	Montevideo.
VENEZUELA	**COLOMBIA**	**BR. GUIANA**
Caracas, Ciudad Bolivar. Maracaibo.	Barranquilla.	Georgetown, Rose Hall, New Amsterdam.

Also 90 Branches in
CUBA, PORTO RICO, DOMINICAN REPUBLIC, HAITI, COSTA RICA, BR. HONDURAS, BRITISH WEST INDIES and FRENCH WEST INDIES

614 Branches throughout CANADA & NEWFOUNDLAND

LONDON	PARIS	NEW YORK	BARCELONA
Princes St., E.C.	28, Rue du Quatre-Septembre.	68, William St.	Plaza de Cataluna 6.

THE ROYAL BANK OF CANADA

CAPITAL PAID UP & RESERVES $41,000,000 GOLD
TOTAL RESOURCES - - $500,000,000 GOLD

UBEL

If you are interested in Gun Metal Steam Fittings and Boiler Mountings, write for Catalogue Section "A"; Extruded Metals and Alloys, "B"; Rock Drill Pneumatic Fittings, "D"; Expansion Joints and Bends, "E"; Fire Fittings, "F"; Special Ships' Fittings, "G"; Heating Fittings, "H"; Injectors and Ejectors, "J"; Iron Stop and Sluice Valves, "K"; Lubricators and Lubricating Devices, "L"; Cast Iron Plug and Gland Cocks, "N"; Engine Governors, "O"; Semi-Rotary and General Hand Pumps, "P"; Spraying and Lime-washing Machinery and Garden Fittings, "S"; Steam Traps, "T"; Plumbers' Water Fittings, "W."

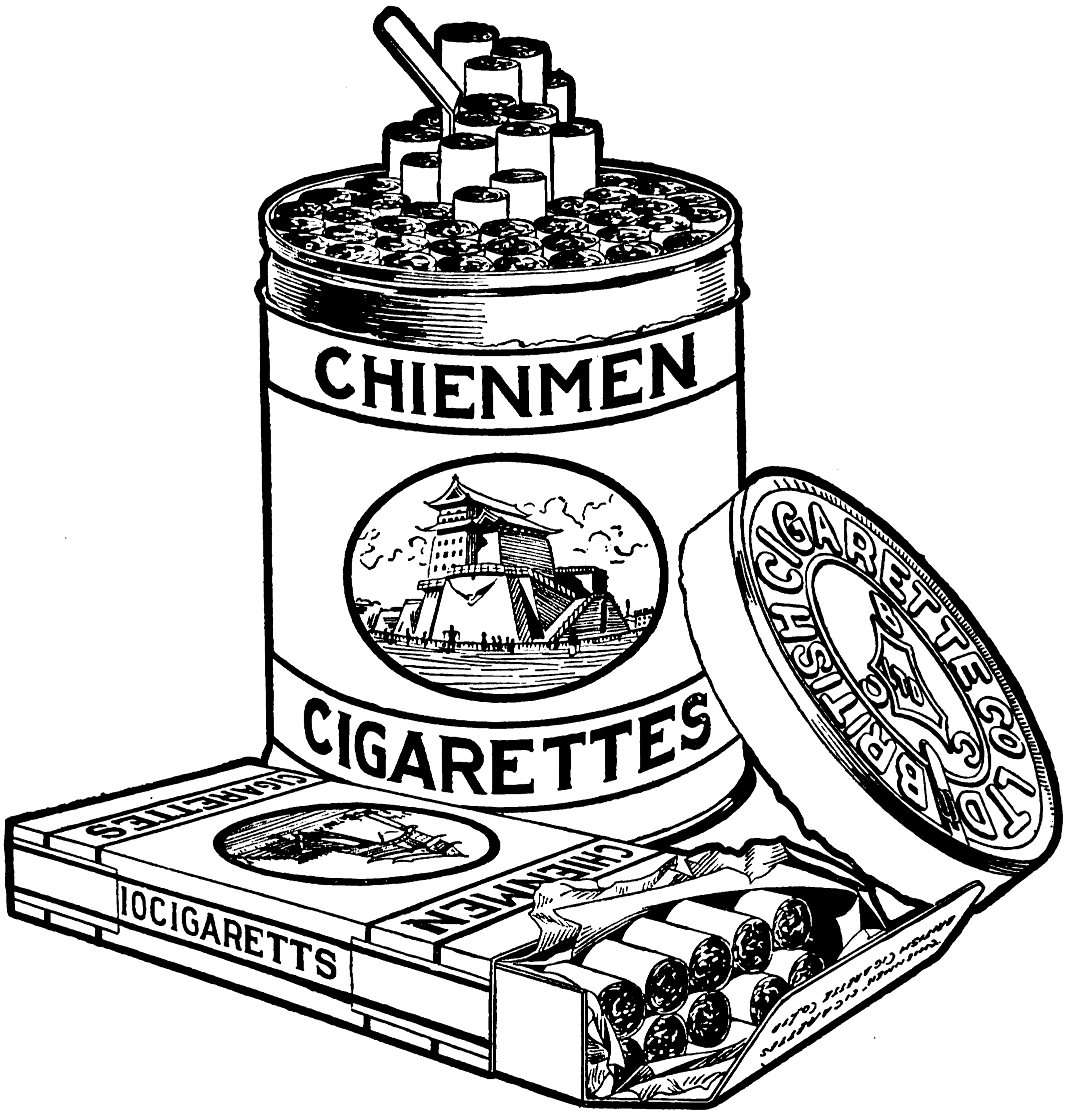
United Brassfounders and Engineers Limited

FIVE WORKS UBEL 3000 WORKERS
HEAD OFFICE EMPRESS FOUNDRY
CORNBROOK MANCHESTER ENGLAND

Ubel Agents: ANGLO-CHINESE ENGINEERS ASSOCIATION, LTD., 83 Chao Yung Ken, Peking

CHIENMEN

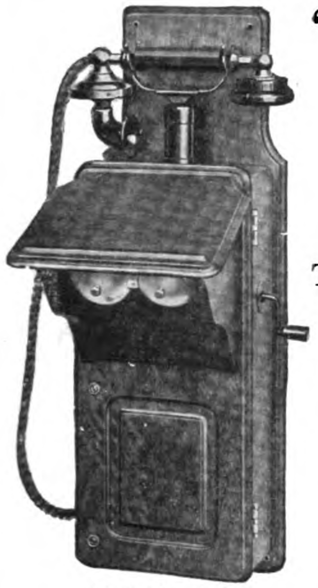
Cigarettes



A brand well known to the "High Grade Cigarette Smoking Public" of China.

BRITISH-AMERICAN TOBACCO CO. (CHINA), LTD.

Distributors



Code No. 5020
Magneto Telephone

"USE IS THE TEST"

MANUFACTURERS
of
High Grade
TELEPHONE APPARATUS

Plans and Specifications furnished for Complete Telephone SYSTEMS.

Village, City and Long Distance Service

KELLOGG SWITCHBOARD & SUPPLY CO.

Head Office & Factory,
Chicago, U.S A.

Tel. Add.
"SWITCHBOARD"

Far Eastern Branch
No. 62 Kiangse Rd.
SHANGHAI.

DIAMOND
POWER SPECIALTY CORPORATION

Exclusive Manufacturers in the United States of

DIAMOND
SOOT BLOWERS

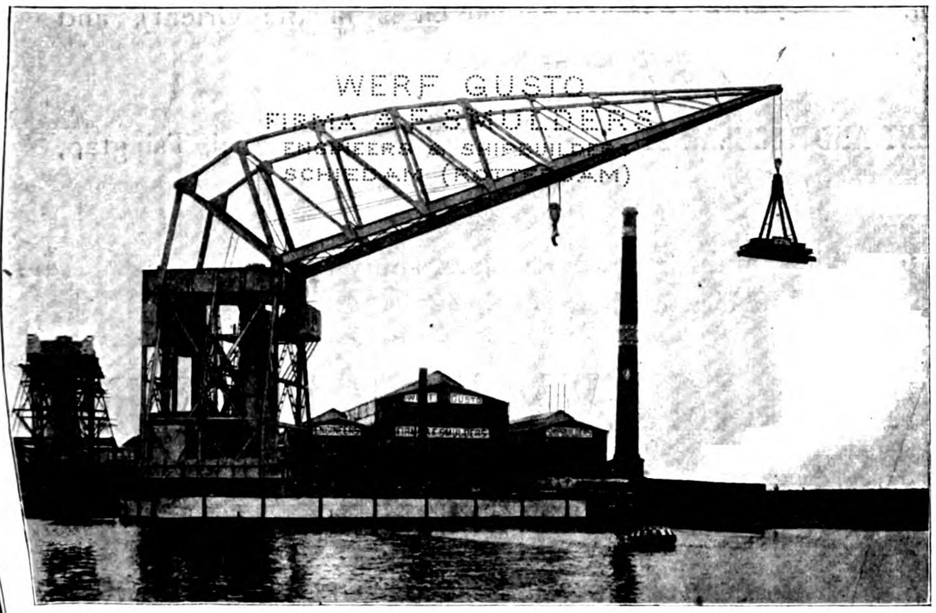
For all high-pressure steam boilers.

10340 Oakland Avenue,
DETROIT, MICHIGAN, U.S.A.

WERF GUSTO (Firma A. F. Smulders)

SOLE AGENTS IN UNITED KINGDOM

ANDERSON RODGER
38 VICTORIA STREET, LONDON. SW. 1. Tel. Vict. 3887



150-TON CRANE.

SHIPBUILDERS & ENGINEERS
SCHIEDAM, HOLLAND

FLOATING CRANES of great power, from 50 to 400 tons and more (of late years we have supplied 24 of these cranes from 60 to 400 tons.)

DREDGING PLANT of all types up to the largest capacities.

COALING VESSELS AND COALING ELEVATORS for bunkering steamers mechanically at rates from 150 to 1,000 tons per hour and upwards.

PASSENGER AND CARGO VESSELS, TANK STEAMERS, TUGS, Etc.

BOILERS of all kinds, land and marine.

BRIDGE, ROOF & CONSTRUCTIONAL STEEL WORK of every description by our own Boiler and Girder Works.

A. F. SMULDERS, Grace Berleur,
n/c Liege, Belgium.

SOUTH MANCHURIA RAILWAY

MANCHURIA AND CHOSEN LINES

Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul and Dairen and Changchun), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least twice a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

SOUTH MANCHURIA RAILWAY COMPANY

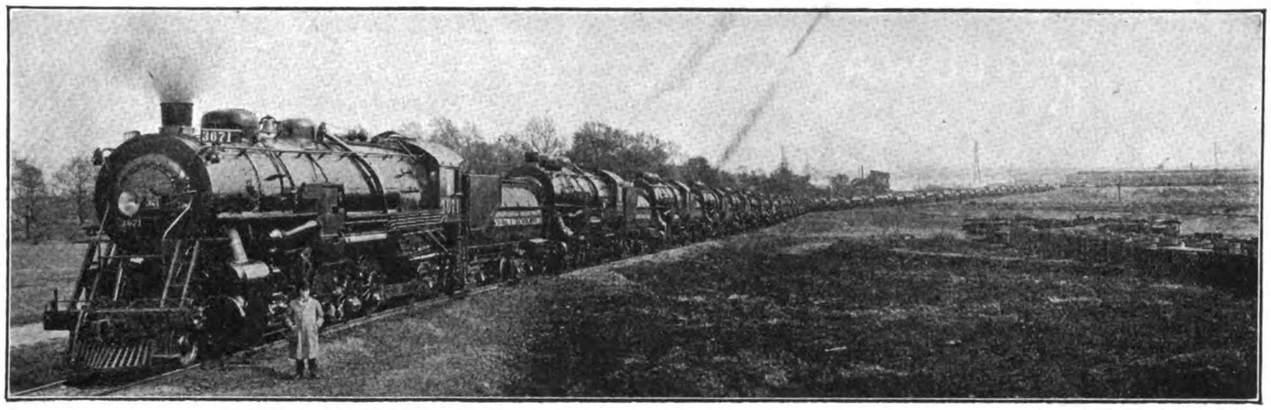
Head Office: DAIREN

Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

Telegraphic Address: MANTETSU or SMRCO. Codes: A.B.C. 5th & 6th Editions, A1 Lieber's, and Bentley's

BALDWIN

World's Heaviest
Train of Big Locomotives Moved Across the United States of America



IN railroad circles throughout the world, much interest was shown in the recent movement of a train of twenty 2-10-2 type, oil burning locomotives, from these Works on the Atlantic Coast across the United States, to the Pacific Coast.

We recently built fifty of these most powerful type of locomotives for the Southern Pacific Lines and all will be in service this year, handling rapidly increasing traffic.

The principal dimensions of these locomotives are: Cylinders, 29½ by 32 inches. Working pressure, 200 pounds. Driving wheels, diameter, 63½ inches. Total length, engine and tender, 97 feet 3¼ inches. Weight in working order, engine, 398,000 pounds. Total weight, engine and tender, 621,000 pounds. Tractive force, 75,150 pounds.

We are prepared to design and build locomotives for any railway in the world and make prompt deliveries.

SALE & FRAZAR, LTD., Tokyo and New York
J. M. WRIGHT, Bandoeng, Java, D. E. I.
C. BREWER & CO., LTD., Honolulu, Hawaii
NEWELL & CO., Melbourne, Victoria
ANDERSEN, MEYER & CO., LTD., Shanghai and New York
PHILLIPS & PIKE, Wellington, New Zealand
R. TOWNS & CO., Sydney, New South Wales
LESLIE & CO., Perth, Western Australia
PACIFIC COMMERCIAL CO., Manila, P. I., and New York
J. W. KELKER, Harbin, Manchuria

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U.S.A.
Cable Address: "Baldwin, Philadelphia"

819

LOCOMOTIVES

JAPANESE
GOVERNMENT
RAILWAYS

THOROUGHLY EQUIPPED LINES REACH EVERY PLEASURE RESORT AND BUSINESS POINT

Reserved Cars, Private Cars, Special Trains on Previous Arrangement for Tourists' Parties of all Sizes

WELL-FURNISHED PASSENGER CARS WITH SLEEPING AND DINING ACCOMMODATION ON THROUGH TRAINS AND EXPRESSES

TWO MOST RELIABLE ORGANIZATIONS FOR TRAVELLERS

1. JAPAN TOURIST BUREAU
   Peking Office: Morrison Road, Peking
   Head Office: Tokyo Station, Tokyo, Japan
2. JAPAN HOTEL ASSOCIATION
   c/o Traffic Bureau, Japanese Government Railways

For Particulars, Time-Tables, Guide Books, etc., please apply to
TRAFFIC BUREAU, DEPARTMENT OF RAILWAYS, TOKYO, JAPAN

JAPANESE
GOVERNMENT
RAILWAYS

THROUGH BOOKING TO AND FROM

CHINA

Single and Return Tickets between China and Japan via Chosen

Period of Validity: Single, 40 days: Return, 110 days. 20% Reduction for Return Tickets

China-Japan Party Trip Tickets

Period of Validity: Two months. Reduction: 25%-50% for 10 or more passengers

China-Japan Circular Tour Tickets

Period of Validity: Four months. Reduction: 30% for Railway; 25% for Steamer

China-Japan Parcel Through Traffic

Parcel through conveyance between the principal stations in China and Japan viâ Chosen at low rates

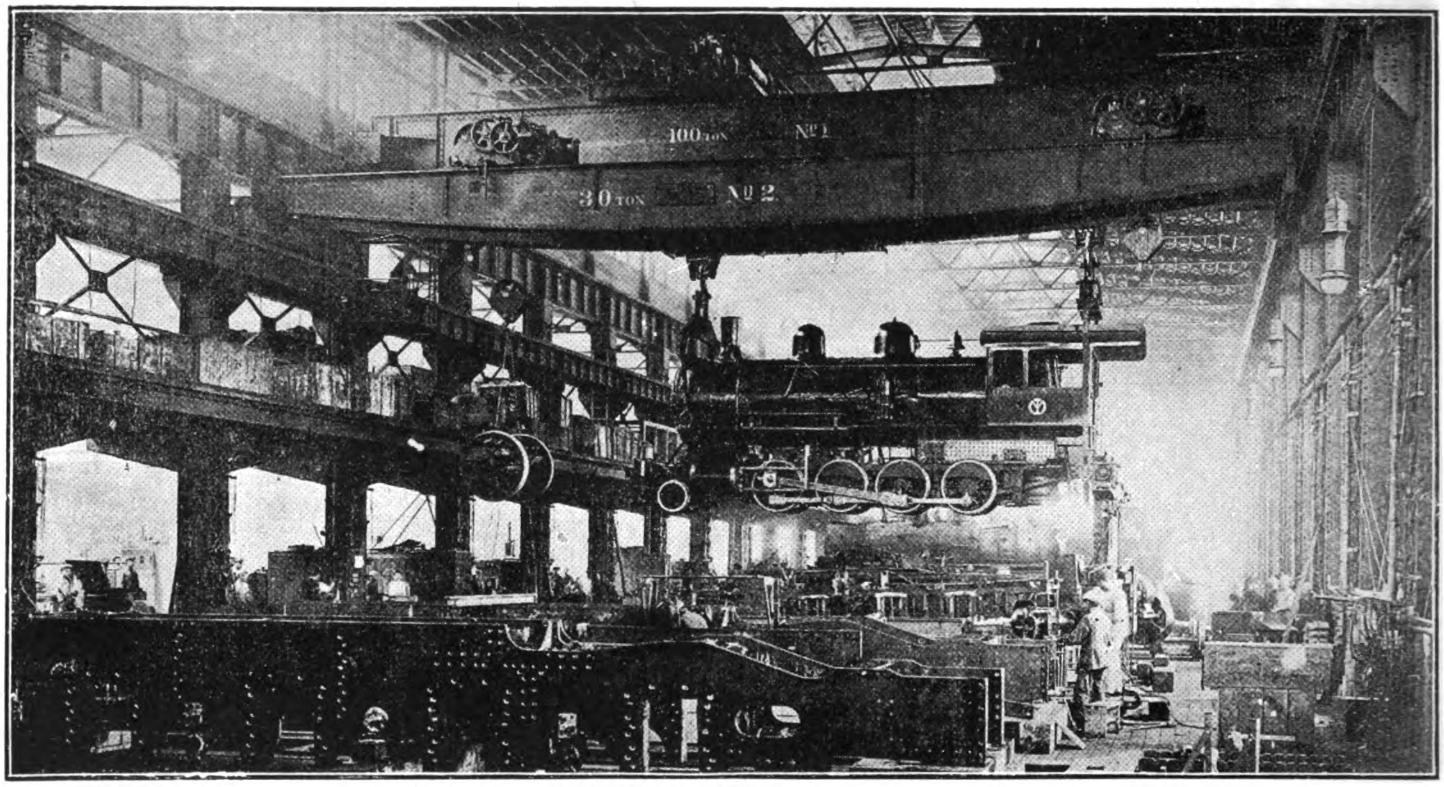
OFFICIAL GUIDE TO EASTERN ASIA

1st	Vol. Manchuria and Chosen	Y. 7.00	Sold at Kelly & Walsh (Yokohama, Shanghai)
2nd	„ S.W. Japan	Y. 5.00	„ Maruzen (Tokyo)
3rd	„ N.E. Japan	Y. 5.00	„ Offices of Japan Tourist Bureau (Tokyo, Kobe, Peking, etc., etc.)
4th	„ China (Proper)	Y. 7.00	
5th	„ East Indies	Y. 5.00	„ G. P. Putnam's Sons Co. (New York)
			„ The Philippine Educational Co. (Manila)

SOUTH MANCHURIA RAILWAY

RAILWAY

SHAKAKO WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

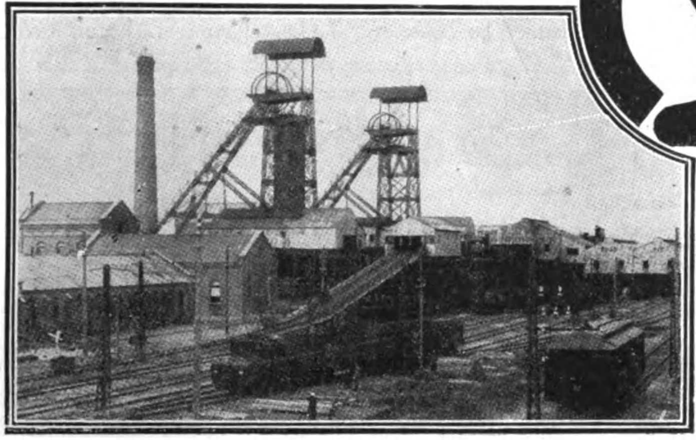
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

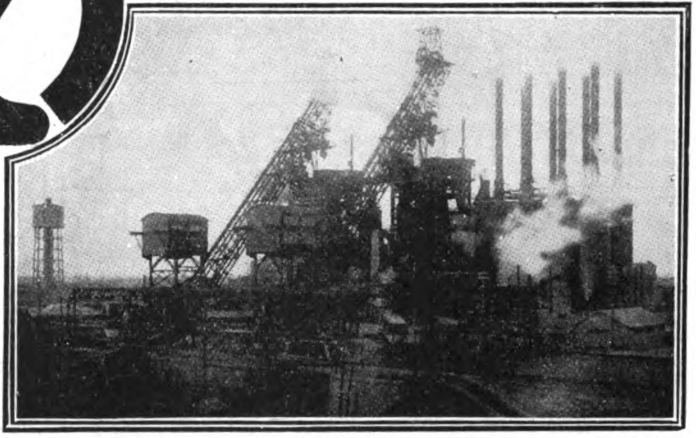
THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON



Togo Pit of the S.M.R. Fushun Collieries



Anshan Steel Works of the S.M.R.

FUSHUN COAL

The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

Depots:

Dairen (Yingkou), Port Arthur, Tientsin, Newchwang, Tsingtao

Agencies:

Chefoo, Manila, Hongkong, Sourabaya, Singapore, Penang, Takao (Formosa), Batavia, Yokohama, South Seas, Niigata, Osaka, Nagoya, Shanghai, Moji, Saigon, etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day) Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day) Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

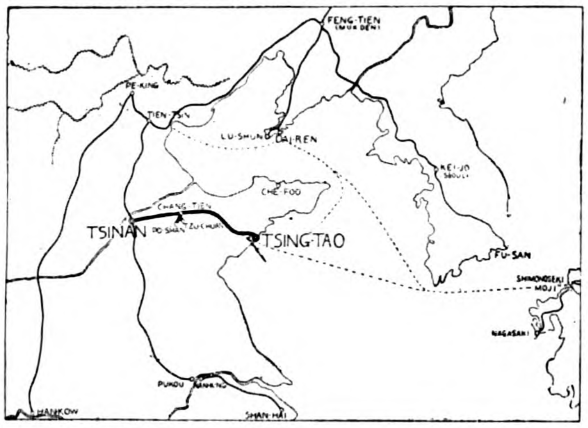
A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

BUT THE TWAIN HAS MET AND BLENDED HERE

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.
For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.
Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway.
At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.
The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1	leaves Tsingtao	daily 10.00 p.m.	arrives Tsinan	8.00 a.m.
Train No. 3	leaves Tsingtao	daily 8.00 a.m.	arrives Tsinan	6.40 p.m.
Train No. 2	leaves Tsinan	daily 11.00 p.m.	arrives Tsingtao	8.35 a.m.
Train No. 4	leaves Tsinan	daily 10.10 a.m.	arrives Tsingtao	8.20 p.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30 ; 2nd class, $7.20.

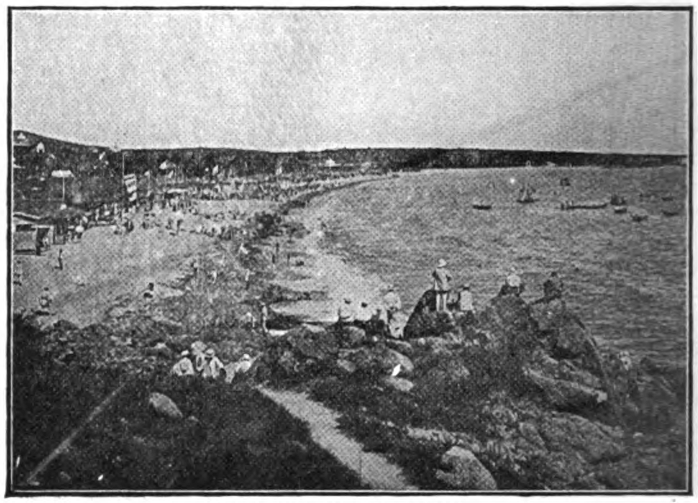
First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.



BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.

TSINGTAU STATION

For Further Information, please apply to

THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

SUPERHEATERS ELESCO

STEAM SUPERHEATERS for Locomotive, Industrial and Marine Service
Feed Water Heater Equipment for Locomotives

Boiler Feed Pumps — Pipe Coils

Designing Engineers and Manufacturers

THE SUPERHEATER COMPANY

General Offices: 17 East 42nd St., New York, U.S.A.

PITTSBURGH STEEL CO.

Pittsburgh, Pennsylvania, U.S.A.
Manufacturers of "PITTSBURGH PERFECT"

OPEN HEARTH STEEL PRODUCTS

INCLUDING

- Galvanized Wire
- Bright Hard Wire
- Bright Nail Wire
- Annealed Wire
- Bright Soft Wire
- Bolt and Rivet Wire
- Galvanized Barbed Wire
- Wire Nails
- Fence Staples

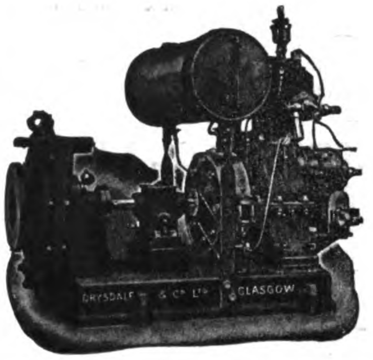
Pig-Iron, Blooms, Billets, Wire Rods, Hard Spring Coil Wire, Twisted Cable Wire, Bale Ties, Steel Hoops, Steel Bands, Cotton Ties and Fabricated Stock, Poultry and Lawn Fencing.

We are prepared to give PROMPT SERVICE, and solicit your inquiries accompanied by complete specifications.

ADDRESS:

PITTSBURGH STEEL CO.
EXPORT DEPARTMENT:
EQUITABLE BUILDING, NEW YORK, U. S. A.
Cable Address: "PITTSTEEL."

"BON ACCORD" CENTRIFUGAL PUMPS



Self-Lubricating Centrifugal PUMPING ENGINES.

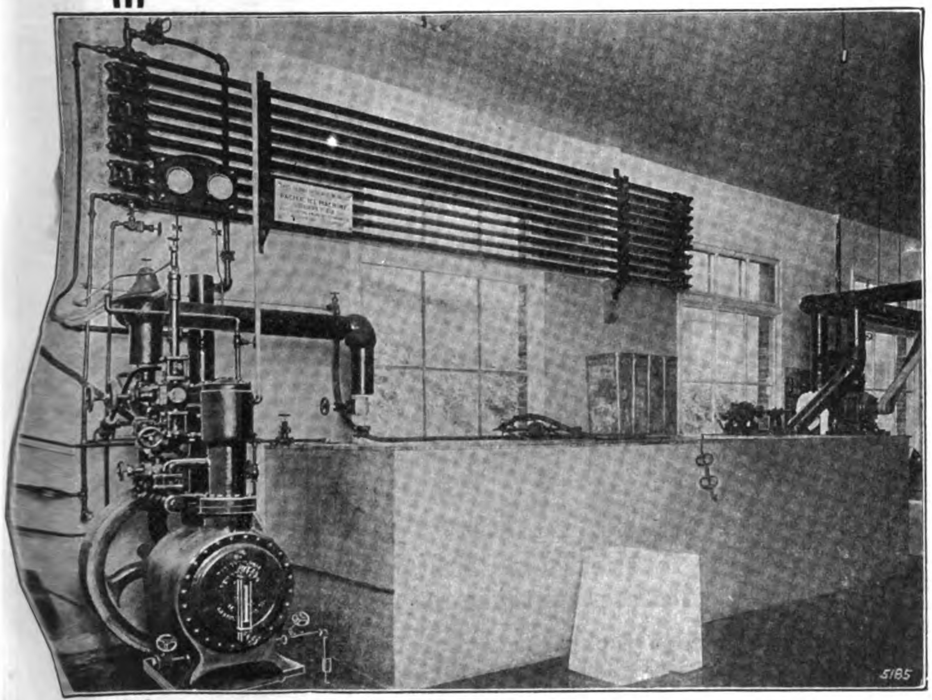
MARINE and LAND TYPES for all DUTIES.

HIGH SPEED ENGINES for driving DYNAMOS, FANS, ETC.

Try "Bon Accord" Packing for the Stuffing Boxes of your Pumps and Engines.

DRYSDALE & CO., LD.,
YOKER, GLASGOW, SCOTLAND.

Brunswick Ice Plants



Here is the illustration of a typical standard *Brunswick* ice plant. It shows a plant which will produce two tons of ice daily. We also manufacture standard plants varying in capacity from two hundred fifty pounds to six tons. These plants are furnished for either steam or belt drive and are especially adapted to small towns, haciendas, plantations, large camps, cantonments, hospitals, etc.

These plants are the finest of their kind. No pains have been spared to make them in every respect as perfect as possible. Their construction is simple. Their parts are few and interchangeable. They are strong, sturdy and rugged,—built to stand hard usage and wear well. The running parts move free and true; the action is smooth and easy; the alignment of parts precise.

We want you to investigate these *Brunswick* ice plants if you are interested in ice-making machinery. You will find them built right, easy to operate, wonderfully efficient and dependable in every respect. Blue-prints and detailed instructions for installations and operation furnished with each plant.

Brunswick—Kroeschell Co.

BRUNSWICK

Dept. 2, New Brunswick, N.J., U.S.A.

PUBLISHED ANNUALLY

THE LONDON DIRECTORY

with Provincial & Foreign Sections,

enables traders to communicate direct with

MANUFACTURERS & DEALERS

in London and in the Provincial Towns and Industrial Centres of the United Kingdom and the Continent of Europe. The names, addresses and other details are classified under more than 2,000 trade headings, including

EXPORT MERCHANTS

with detailed particulars of the Goods shipped and the Colonial and Foreign Markets supplied ;

STEAMSHIP LINES

arranged under the Ports to which they sail, and indicating the approximate Sailings.

One-inch BUSINESS CARDS of Firms desiring to extend their connections or Trade Cards of

DEALERS SEEKING AGENCIES

can be printed at a cost of 30 shillings for each trade heading under which they are inserted. Larger advertisements from £2 to £16.

A copy of the directory will be sent by parcel post for 40 shillings nett cash with order.

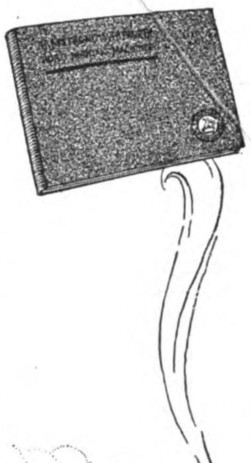
THE LONDON DIRECTORY CO., LTD.

25 Abchurch Lane, London, E.C. 4, England

BUSINESS ESTABLISHED 108 YEARS

ARMSTRONG-WHITWORTH

SHIPS
MARINE ENGINES
LOCOMOTIVES
MACHINE TOOLS
FORGINGS CASTINGS
DROP STAMPINGS
HIGH SPEED STEELS
SMALL TOOLS GAUGES
PNEUMATIC TOOLS
NON-FERROUS PRODUCTS
OIL & GAS ENGINES
HYDRAULIC MACHINERY
HYDRO-ELECTRIC PLANT
GENERAL ENGINEERING
CIVIL ENGINEERING
ROAD ROLLERS



Road Making Machinery

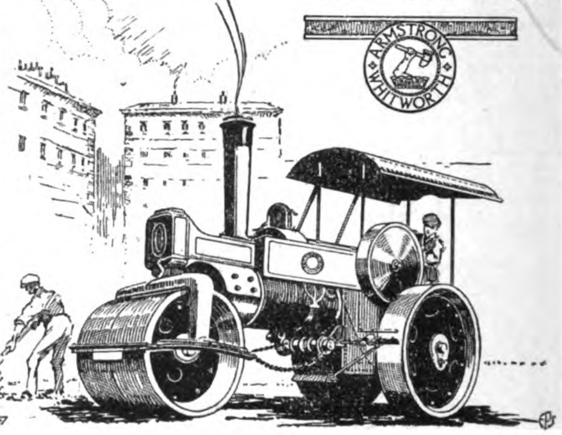
Armstrong Whitworth Road Rollers are designed and constructed to the latest engineering and road-making standards.

A fully informative brochure No. 176 is now available.

Post this page to us with your note-heading and your copy will be forwarded.

Sir W.G. Armstrong Whitworth & Co., Ltd.
18 Great George Street, London, S.W.1.

Telephone Victoria 4010
Codes Bentley's
Telegrams Zigzag, London
Works......Openshaw, Manchester



AWARDED GRAND PRIZE OF HONOUR
PANAMA PACIFIC EXHIBITION, SAN FRANCISCO, 1915.
MOST POPULAR **BEER** IN THE ORIENT

ASAHI **YEBISU** **SAPPORO**

BREWED BY

THE DAI NIPPON BREWERY CO., LTD.

HEAD OFFICE: TOKYO

BRANCHES OSAKA, SAPPORO, SEOUL, SHANGHAI, TSINGTAO.

SOLD EVERYWHERE

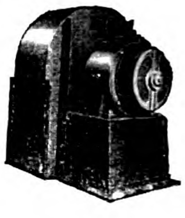
Agents: MITSUI BUSSAN KAISHA,
China, Straits Settlements, Dutch East Indies, and British India

We are Specialists in the Design, Construction and Application of

FANS

for every conceivable purpose

THE "CYCLONE" Fan is the result of over forty years experience of Ventilating Engineering.



The REGISTERED TRADE MARK CYCLONE

Fan is the Most Reliable & Efficient Ventilating Instrument on the Market

As Installed in Buckingham Palace & the House of Commons. In use in all the leading Industries throughout the world.

Write now for Booklet No. 391.

MATTHEWS & YATES, Ltd., Cyclone Works

Swinton, Nr. Manchester

THE

North-China Daily News

Established in 1850 as a weekly; in 1870 as a daily

To the Reader

The "North-China Daily News" writes the history of China. It records the pulse of its politics; it reports the conditions of its finance and its markets; and it chronicles the daily doings of its people.

To the Advertiser

The greatest purchasing power in China is that possessed by readers of the "North-China Daily News." It is the newspaper which is found in every office, consular or commercial; it is the newspaper most frequently quoted both by the foreign and vernacular press; and it is the one newspaper which combines a quality with a quantity circulation—being the largest both in size and circulation in China. It was the first newspaper to publish audited circulation statements.

Subscription: Mex. $28 per annum.

(Postage Extra).

The North-China Herald

Is the weekly edition of the "North-China Daily News" for readers abroad. It contains 95 per cent. of news and is the best medium for keeping in touch with events in China when out of reach of the daily.

Subscription: Mex. $16 per annum.

(Postage Extra).

Copies of either of the above publications will be sent to anyone interested on request.

NORTH-CHINA DAILY NEWS & HERALD, LTD.,
Shanghai.

Telegraphic Address: "Herald Shanghai."—All Codes.

A NORTH-CHINA TRADE DIRECTORY

The North China Desk Hong List

Is the only Trade Directory of North China issued twice a year. Its information is the most accurate and complete. Published regularly since 1865 it has grown to 900 pages. In addition to the names and addresses of every foreign firm, resident, and missionary in China it contains the following classified information:—

SHANGHAI HONG LIST.—All firms, institutions, missions, consulates, etc., in Shanghai, with staffs, arranged alphabetically.

TRADE DIRECTORY.—A list of all Shanghai firms under their professional or trade headings.

AGENCIES.—Agencies held by Shanghai firms are listed alphabetically, with the firm's name after them.

STREET DIRECTORY.—A list of the streets of Shanghai in English and Chinese, with the occupants of all foreign and many Chinese houses, offices, and stores.

SHANGHAI WHO'S WHO.—An alphabetical list of the men of Shanghai, with their business addresses.

RAILWAYS.—A list of the Northern Railways of China, with their foreign and native staffs, including those resident in Shanghai.

RESIDENTIAL DIRECTORY.—A complete list of the foreign residents of Shanghai, arranged alphabetically, with their private addresses.

OUTPORT HONG LIST.—A list of Northern and Central China cities and outports with foreign firms and institutions and their staffs.

OUTPORT WHO'S WHO.—An alphabetical list of foreign men in Northern and Central China, compiled from the Outport and Railway Sections of this work.

OUTPORT LADIES' LIST.—An alphabetical list of foreign ladies, not engaged in mission work, resident in Northern and Central China.

OUTPORT MISSIONARIES.—Classified alphabetically by provinces. Under the names of the provinces are given the towns where missions are established, with list of residents. This is divided into two sections: (1) Protestants, (2) Roman Catholics. Mission Institutions, such as Schools, Colleges, etc., will be found under the respective Ports in which they are instituted.

MISSIONS WHO'S WHO.—An alphabetical list of missionaries of each denomination, compiled from the previous section.

GENERAL.—Consular, postal, exchange and other information.

PRICES:

Shanghai **$8** with map **$6** without map

On Sale at the Offices of

The North-China Daily News

(Temporary offices during rebuilding)

2B Kiukiang Road, Shanghai

The "PEAK" Pinion

"THE" NOISELESS GEAR FOR HOT CLIMATES

The "PEAK" PINION is pre-eminent among Noiseless Pinions by reason of the following features:—

1.—It is stronger than any other "noiseless" Pinion made.

2.—It is light in weight (not needing to be reinforced by metal plates).

3.—It is impervious to water, oil, acid and alkali.

4.—It is unaffected by heat.

5.—It can be stored for any length of time without distortion.

6.—It is vermin proof.

"PEAK" Pinions can be used wherever metal gears are employed. By their use the nerve-racking clatter of metal-to-metal gears is done away with. They are smooth-running, and have no "ring." On high-speed electric motors, for positive drives, they are essential, and by their cushioning effect not only save the companion-wheels but prevent vibration and consequent damage to both motor and machine. The Pinions are turned, bored, key-wayed, and teeth accurately machine-cut, and finished complete ready for fitting to shaft.

SOLE MAKERS:

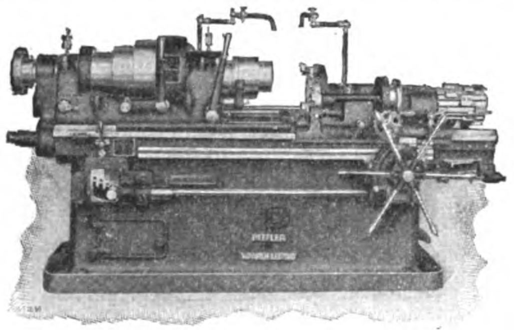
THE REAY GEARWORKS, LTD.

(Manufacturers of all classes of Toothed Gearing),

GATESHEAD-ON-TYNE, ENGLAND

The

PITTLER TURRET LATHE



One of the Factors of German Industrial Efficiency

Catalogue containing valuable information about up-to-date machining methods free on request

PITTLER

Werkzeugmaschinenfabrik A.-G

LEIPZIG - WAHREN

Makers of: Genuine Pittler Turret Lathes, Single-spindle and Multiple-spindle, Automatic Screw Machines, Automatic Pin and Stud Lathes, Self-opening Die-Heads

Transatlantische Handelskompagnie m.b.H.

HAMBURG

Cable address: Handelslot.—Codes: A.B.C. 5th, 6th Bentley, Carlowitz

Speciality Export of :
- Steel Bars, Plates, Girders, Wire, Wire-nails, Hardware, Cutlery.
- All kinds of Paper.
- Drugs & Chemicals & Sundries.

Seeks connections with 1st class buyers or importers.

SUBSCRIBE

TO THE

FAR EASTERN REVEW

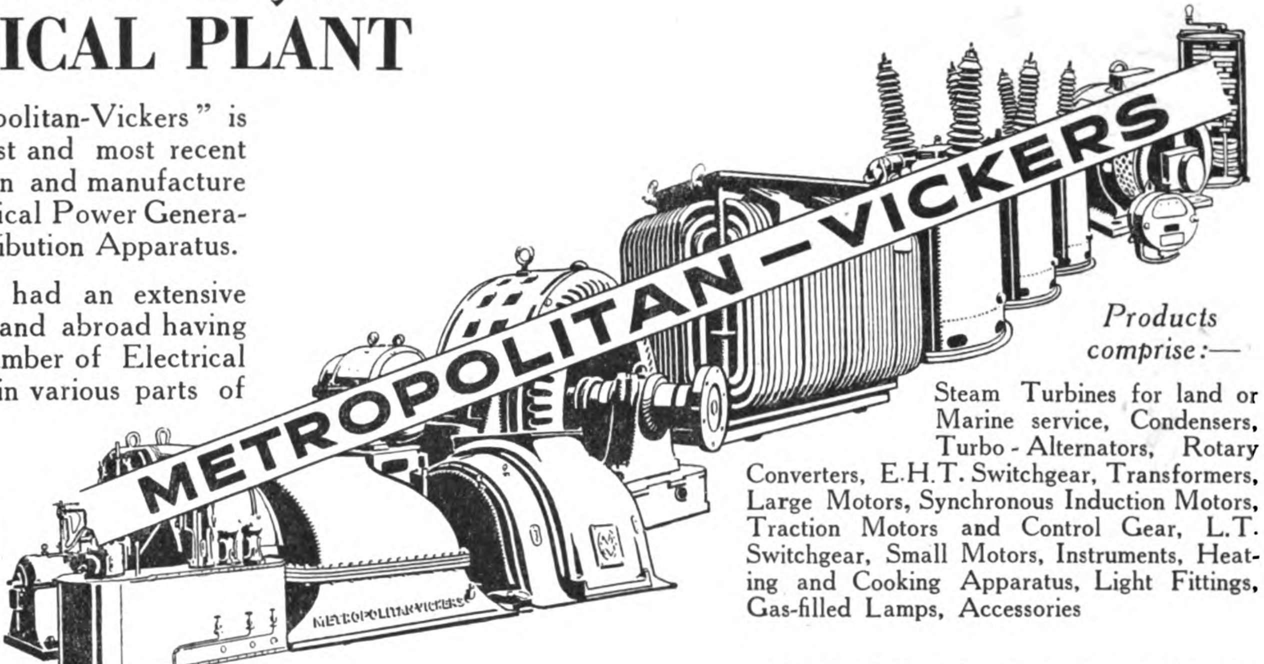
THE ONLY ENGINEERING

PUBLICATION IN THE FAR EAST

This name
should be on all your
ELECTRICAL PLANT

The name "Metropolitan-Vickers" is indicative of the best and most recent practice in the design and manufacture of all kinds of Electrical Power Generation Plant and Distribution Apparatus.

The Company has had an extensive experience at home and abroad having equipped a large number of Electrical Power Installations in various parts of the world.



Products comprise:—

Steam Turbines for land or Marine service, Condensers, Turbo-Alternators, Rotary Converters, E.H.T. Switchgear, Transformers, Large Motors, Synchronous Induction Motors, Traction Motors and Control Gear, L.T. Switchgear, Small Motors, Instruments, Heating and Cooking Apparatus, Light Fittings, Gas-filled Lamps, Accessories

Agents for China:

Messrs. Arnhold Bros. & Company, Limited,

SHANGHAI

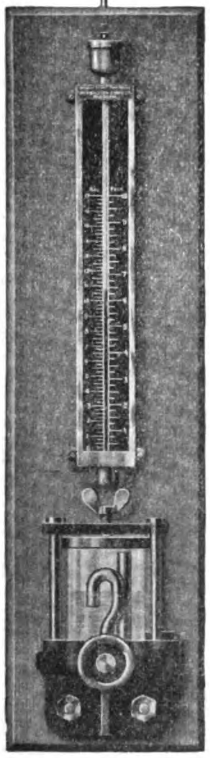
Tientsin	Hankow
Peking	Changsha
Newchwang	Chungking
Mukden	Ichang
Harbin	Shansi

Hongkong
Canton

The Mark of Efficiency

METROPOLITAN Vickers ELECTRICAL CO. LTD.
TRAFFORD PARK - - - - - - - MANCHESTER
ENGLAND 2046C

Bonlow



PATENT

AUTOMATIC TANK GAUGE

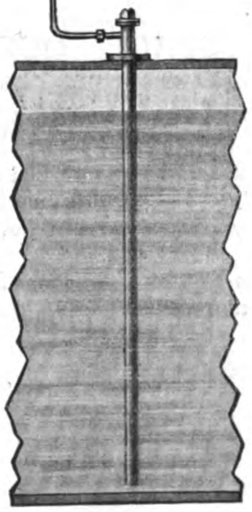
For all Types of Tanks on Board Ship and Land. Easy to Install. Easy to Read.

Can be installed at any distance from Tanks.

No complicated bell in tank, only a straight pipe which can be easily cleaned without opening tank.

The Gauge is self-checking, which ensures accurate Readings.

Full particulars and catalogue gladly sent on request to the Sole Makers:

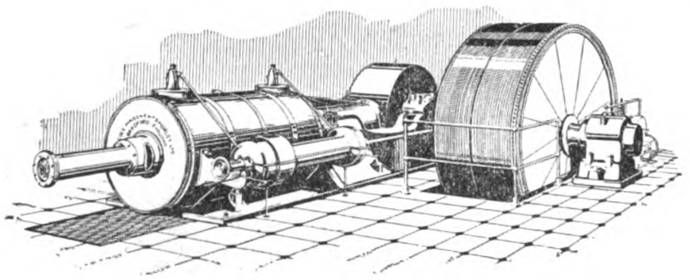


Archibald Low & Sons, Limited,

Merkland Works, Partick, Glasgow, Scotland

Telegrams: "Highlow, Glasgow" Code: A.B.C.

London Show Rooms: J. H. T. PETERSEN (ENGINEERS MERCHANTS), LTD., 59 Shoe Lane, E.C.4.



C. M. & M. CENTRAL EXHAUST STEAM ENGINE

100 to 3,000 I.H.P.

The ideal Prime Mover for driving Mills and Plant where moderate power from 100 to 3,000 I.H.P. is required

PRINCIPAL FEATURES

ECONOMY: The steam consumption equals that of a good Triple Expansion Engine.

SIMPLICITY: This type of engine is undoubtedly the simplest economical engine of the present day.

UPKEEP COSTS: Owing to the low steam consumption, simplicity and to the fact that forced lubrication is fitted, upkeep costs and attendance are reduced to the minimum.

FLOOR SPACE OCCUPIED: Is considerably less than that required by Horizontal Compound Engines.

The above illustration is of a 1,500 I.H.P. C. M. & M. Central Exhaust Steam Engine recently shipped to Hankow, China.

Write to-day for Catalogues Nos. 63 & 69, which will be sent post free on request.

ESTA. 1848

REG? TRADE MARK

Cole, Marchent & Morley, Ltd.

Bradford, England

Cables: "Cole Bradford"

Consolidated Safety Valves have a Higher Factor of Safety

The greater relieving capacity of Consolidated Safety Valves, compared with that to ordinary safety valves, gives them a marked superiority.

They are guaranteed to relieve pressure at the point for which they are set, and will positively prevent any over-pressure.

Consolidated Safety Valves are made of a special bronze composition, handsomely finished, and each valve carries a plate on which are stamped the popping pressure, lift, closing pressure and capacity. Connections conform to British or Metric standards.

Our agent is prepared to advise you regarding selection of the proper size and to quote prices. Consult him also, regarding Ashcroft Gauges and Metropolitan Injectors, used for years by engineers the world over.

Manning, Maxwell & Moore, Inc.

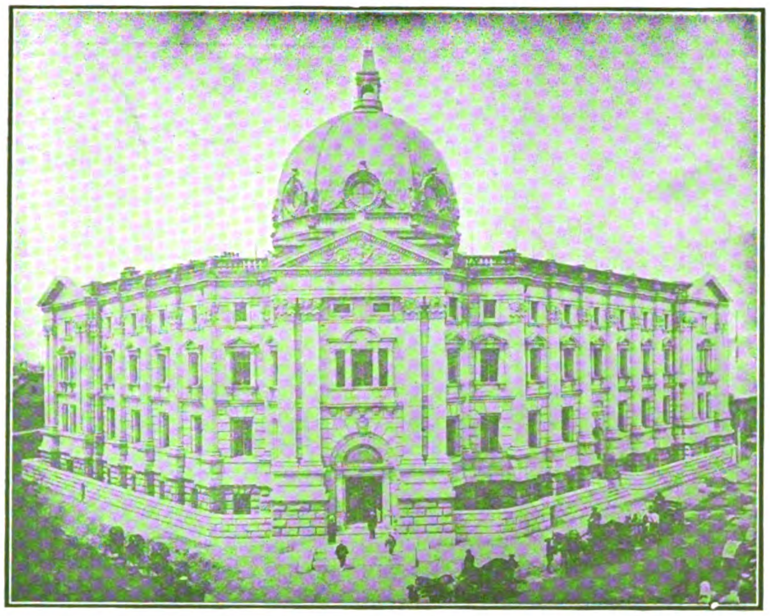
New York

Henry Katten, 22 Kiukiang Road, Shanghai, China

CONSOLIDATED SAFETY VALVES

Capital (Fully Paid-Up):
Yen 100,000,000

Reserve Fund:
Yen 61,000,000



HEAD OFFICE, YOKOHAMA

CORRESPONDENTS
AT ALL
THE CHIEF
COMMERCIAL CITIES
IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: KENJI KODAMA, Esq.
Vice-President: REITARO ICHINOMIYA, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASUNOSUKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
NAKAJI KAJIWARA, Esq.
SHIMAKICHI SUZUKI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
BARON KAISAKU MORIMURA
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.
HIROZO MORI, Esq.
KUNIZO MOGAMI, Esq.

Head Office: YOKOHAMA
Manager: N. IGARASHI, Esq.

TOKYO BRANCH
No. 1, Itchome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

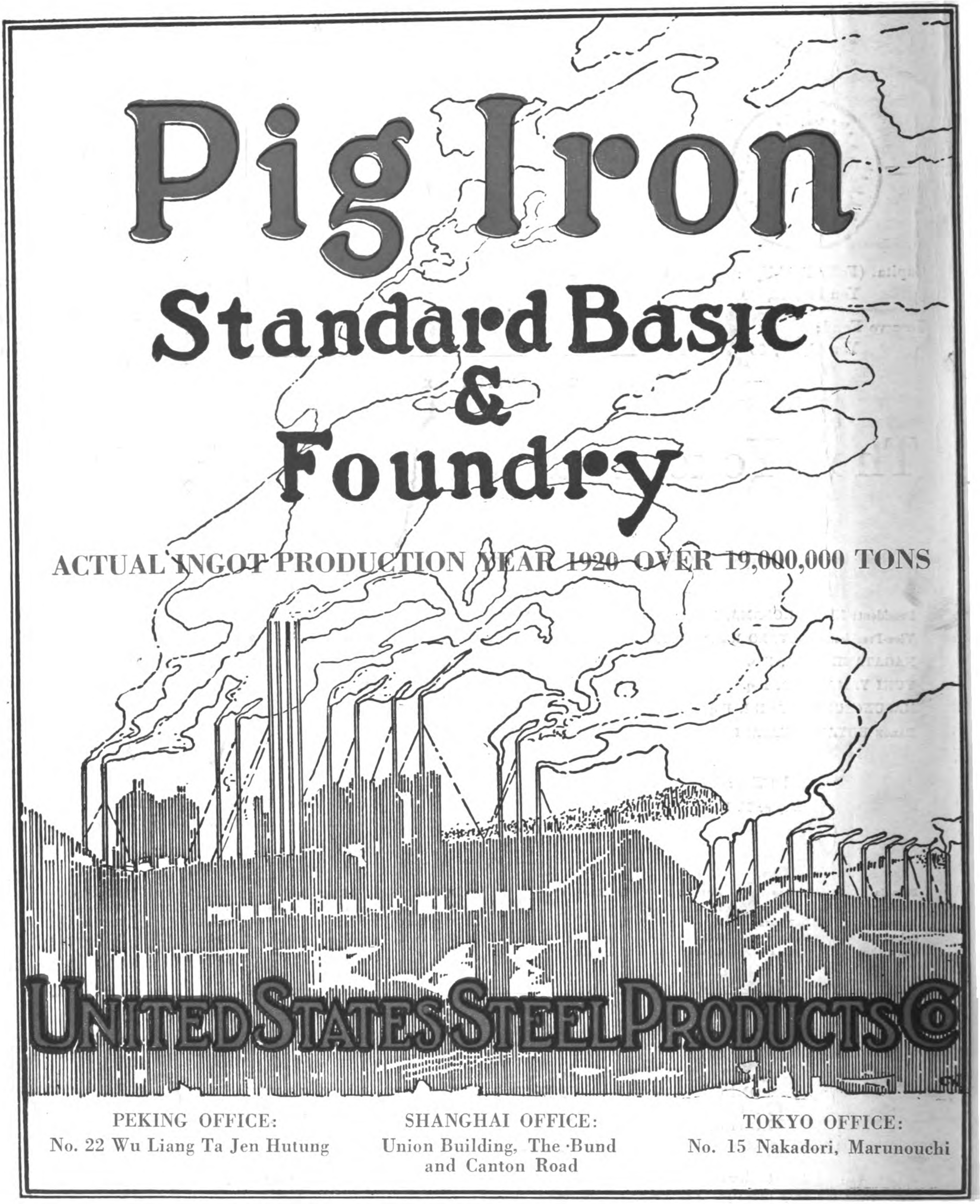
BRANCHES AND AGENCIES.

Batavia	Dairen	Hongkong	Los Angeles (*sub-office of San Francisco Branch*)	Nagcya	Rangoon	Shanghai	Tientsin
Bombay	Fengtien	Honolulu	Lyons	Newchwang	Rio de Janeiro	Shimonoseki	Tsingtau
Buenos Aires	Hamburg	Kaiyuang	Manila	New York	Saigon	Singapore	Tsinan
Calcutta	Hankow	Kobe	Nagasaki	Osaka	San Francisco	Sydney	Vladivostock
Changchun	Harbin	London		Peking	Seattle	Sourabaya	

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.



Printed by the NORTH-CHINA DAILY NEWS AND HERALD, LTD., for the Proprietors.

大正七年七月十日第三種郵便物認可

PP 9990

THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

上海仁記路第五號

遠東時報

AMERICA'S BEST CUSTOMER IN ASIA

Development of a Great Industry

Proposed Bridge Across Yangtze and Han

N. E. I. RAILWAYS

Master American Builder in Japan

Siam State Railways

Vol. XVIII OCTOBER, 1922 No. 10

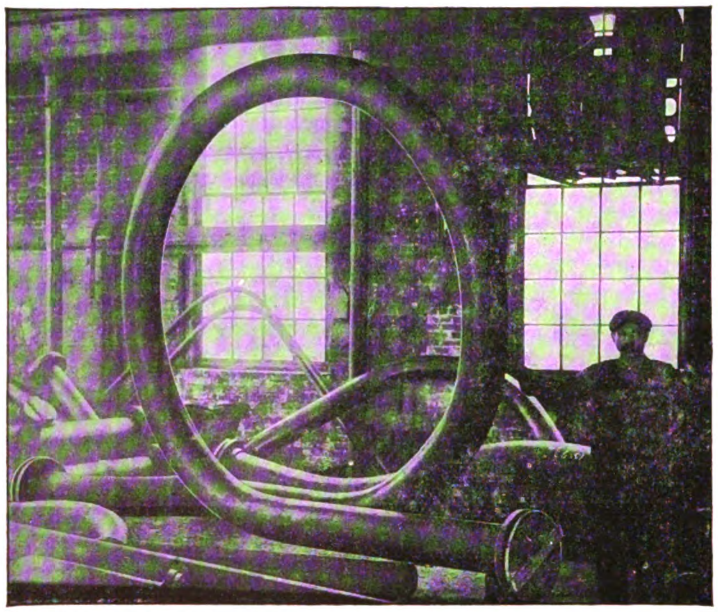
SHANGHAI, PEKING, TOKYO AND MANILA

A. L. TAYLER

WALWORTH POWER PIPING

We are manufacturers of Piping, Valves, Fittings and Accessories for complete power installations.

Bends accurately made to specification, and material shipped ready for erection.



We have especially trained engineers for the handling of export power plant specifications.

Prices quoted promptly on receipt of blue prints and details.

WALWORTH MANUFACTURING COMPANY

Oldest continuous manufacturers in the United States (since 1842) of a complete line of Valves, Fittings and Tools for steam, water, oil, gas, and air. Originators of the Famous "GENUINE WALWORTH STILLSON" Wrench and the "KEWANEE" Union.

Export Sales Agents: WALWORTH INTERNATIONAL COMPANY, New York City, U. S. A.

Foreign Sales Offices in All Principal Cities

For catalog, prices or information, address

HENRY KATTEN

22 Kiukiang Road, Shanghai, China

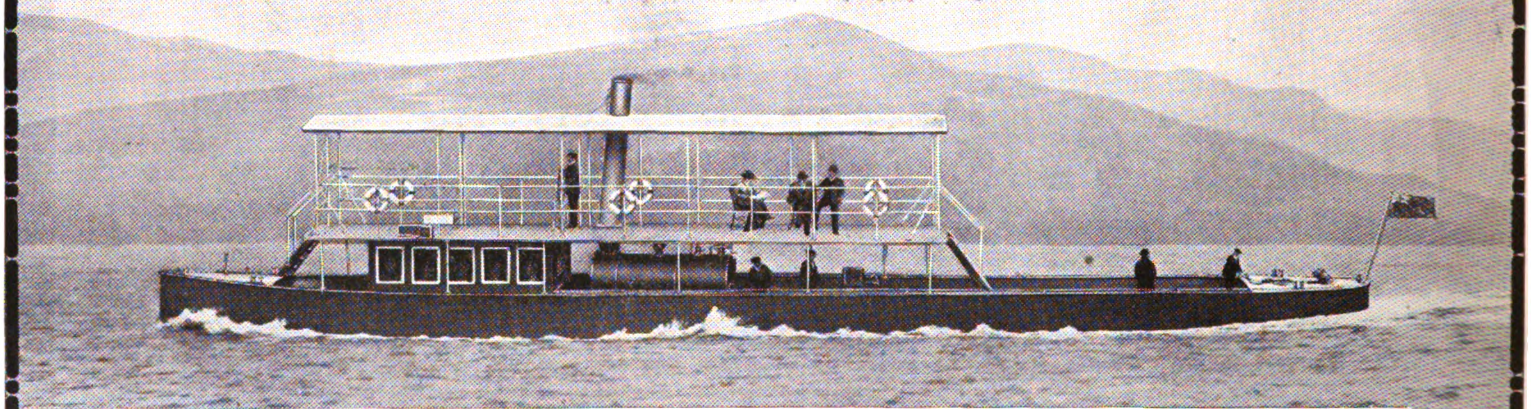
SHALLOW DRAUGHT LAUNCH—YARROW SYSTEM,

built by

YARROW & CO., L^{TD}, Glasgow,

(formerly of Poplar, London).

Yarrows, Limited, of Victoria, British Columbia, Shipbuilders, Ship Repairers and Engineers, are associated with Yarrow & Co., Ltd., Glasgow.



Length, 160-ft.; Beam, 24-ft. 6-in.; Draft, carrying 40 tons 2-ft. 3-in.; Speed, carrying 40 tons 15 Statute miles an hour, burning wood fuel only

Vessel as above illustrated can be shipped whole to any part of the world.

Messrs. YARROW Construct Fast Passenger and Commercial Vessels, Shallow Draught Steamers, Tugs, etc., propelled by Sternwheels, Side Wheels, or Screws working in Tunnels fitted with Yarrow's Patent Balanced Hinge Flap.

RIELLEY, SIMMONS & MILNE, Agents, Shanghai.

FOUNDED, 1904

The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.

HEAD OFFICE: 5 JINKEE ROAD - - - - - SHANGHAI, CHINA.

George Bronson Rea, *Editor and Publisher* William Carter Rea, *Advertising Manager*

JAPAN OFFICE: H. C. Huggins, Representative, No. 12 Takagi-cho, Akasaka-ku, Tokyo.

NEW YORK: British and Colonial Press, Inc., 738 The Knickerbocker Building, Broadway and 42nd Street.

MANILA OFFICE: Fleming, Percy Smith and Seth, Roxas Building, Escolta.

BERLIN: Rudolf Mosse, 46-49 Jerusalemer Strasse.

GREAT BRITAIN: Walter Judd, Ltd., 81-87 Gresham Street Bank, London, E.C.

SAN FRANCISCO: Leroy P. Boyce, Monadnock Building

SUBSCRIPTION IN CHINA: $10.00 Mexican, U. S. & Philippines Gold $5.00, Elsewhere $12.00 Mexican per annum

VOL. XVIII OCTOBER, 1922 NO. 10

CONTENTS:

	PAGE
AMERICA'S BEST CUSTOMER IN ASIA	601
SUN YAT-SEN	603
UNIFYING AMERICAN INTERESTS IN CHINA	606
LEONARD WOOD	607
Pan-Pacific Conference	608
Fuller will Build Dairen Hospital	608
THE DEVELOPMENT OF A GREAT INDUSTRY	*609
Machine Tools in Chinese Shops	611
MENACE TO TRAVEL IN MANCHURIA	*612
TIENTSIN'S NATIVE INDUSTRIES	*613
A MODEL POWER PLANT	*617
GREATER OSAKA WATER SUPPLY	619
NORTH BORNEO—A CHINESE COLONY	*620
Dutch Activities in China	622
Chinese Cement Factory Proposed	622
RADIO IN CHINA	623
SIAM'S RICE MILLS	*624
Chinese Engineering Agency Formed	625
N. E. I. STATE RAILWAYS AND TRAMWAYS	*626
TIN MINES OF THE N. E. I.	*633
GREAT WATERWORKS SCHEME FOR HONGKONG	*635
Cost of Building in the Straits Settlements	636
LIUCHANG COAL MINES	*637
THE MASTER AMERICAN BUILDER IN JAPAN	*638
THE HAN RIVER AND ITS LEVEES	*642
MACAO'S BIG HARBOR IMPROVEMENT SCHEME	647
THE PASSENGER CAR MARKET IN JAPAN	*648
Nobel Industries at the Brazilian Exhibition	653
TOKYO'S NEW HOTEL	*654
THE PROPOSED BRIDGES ACROSS THE YANGTZE AND HAN RIVERS	*656
SIAM STATE RAILWAYS' BUILDING PROGRAM	*662

**Illustrated with Maps or Photographs*

Entered at the U.S. Postal Agency, Shanghai, China, as second-class matter. Registered at the Chinese Post Office as a Newspaper. Entered at the Japanese Post Office as a Newspaper.

ALPHABETICAL LIST OF ADVERTISERS

Admiral Line, The 41
Allen & Co., Ltd., Edgar 14
American Locomotive Sales Corp..... 25
American Tool Works Co. 1
Andersen, Meyer & Co., Ltd. 28
Asbestos Shingle, Slate & Sheathing Co. 17
Ashton Frost & Co., Ltd............ 19
Atlantic, Gulf & Pacific Co. of Manila 36
Attwater & Sons 48
Avery, Ltd., W. & T................ 15

Babcock & Wilcox, Ltd. 31
Baldwin Locomotive Works.......... 65
Bank of Chosen 52
Bank of Communications............ 57
Banque de l'Indo-Chine 54
Bank of Taiwan, Ltd. 55
Bliss Co., E. W. 27
Brill Co., J. G...................... 39
British-American Tobacco Company (China), Ltd. 62
Brunswick Kroeschell & Co......... 71
Bucyrus Company 9
Butterfield & Swire 44

Canada Carbide Co. 15
Chartered Bank of India, Australia & China 48
Chicago, Milwaukee & St. Paul Railway 39
Clough, S. W. 4
Cole Marchent & Morley, Ltd. 76
Craig & Donald, Ltd. 31

Dai-Ichi Ginko 60
Dai Nippon Brewery Co............. 72
Diamond Power Specialty Corporation 63
Dorman Long & Co., Ltd. 3
Drewry Car Co., Ltd. 19
Drysdale & Co., Ltd................ 74

Electricity Department, S. M. C. 4
English Electric Co., Ltd. 13
Evans & Sons (Wolverhampton), Ld., Joseph 2

First National Bank of Boston...... 61
Fuji Gassed Spinning Co. 10

Gleniffer Motors, Ltd. 15
Green Island Cement Co., Ltd., The.. 20
Greenfield Tap & Die Corp.......... 19
Greening & Sons, Ltd., N. 4

Hasler Telegraph Works 71
Heap & Co., Ltd., Joshua 51
Hongkong Rope Manufacturing Co. . 20
Hongkong & Shanghai Banking Corporation......................... 61
Hongkong & Whampoa Dock Co., Ld. 30
Hotel Statler Co. 49
Humber, Ltd. 42

Imperial Japanese Government Railways 66, 67
Industrial Bank of Japan 56
International Banking Corporation.. 53

Japan Sugar Mfg. Co. 6
Jardine, Matheson & Co., Ltd. 12
Jones & Lamson Machine Co......... 51
Jugo Ginko 54

Kanegafuchi Spinning Co., Ltd. 10
Kawasaki Dockyard Co., Ltd....... 35
Kellogg Switchboard & Supply Co... 63

Kelvin, Bottomley & Baird, Ltd..... 8
Kokusai Kisen Kaisha 43

London Directory Co., Ltd.......... 72
Low & Sons, Ltd., Archibald........ 75

Manning, Maxwell & Moore, Inc..... 76
Mather and Platt, Ltd............... 7
Matthews & Yates, Ltd. 72
Metropolitan Vickers Electrical Co., Ltd. 75
McClintic-Marshall Products Co. 27
McConway and Torley Co. 21
Mitsubishi Bank 59
Mitsubishi Iron & Steel Co., Ltd..... 38
Mitsubishi Marine & Fire Ins. Co., Ld. 38
Mitsubishi Shoji Kaisha 18
Mitsubishi Warehouse Co. 38
Mitsubishi Zosen Kaisha, Ltd........ 26
Mitsui Bank 59
Mitsui Mining Co.................. 18
Mitsui Bussan Kaisha 26
Motor Rail & Tram Car Co......... 41
Mustard & Co....................... 4

New Engineering & Shipbuilding Works.......................... 34
Nippon Menkwa Kabushiki Kaisha.. 50
Nippon Yusen Kaisha 46, 47
Nobel Industries, Ltd. 22

Okura & Co. (Trading), Ltd......... 24
One Hundredth Bank, Ltd., The.... 60

Pacific Steamship Co. 41
Pittsburgh Steel Co. 74
Pooley & Son, Ltd., Henry 2

Republic Truck Sales Corp. 42
Royal Bank of Canada 61

Ruston & Hornsby, Ltd.............
Ryerson & Son, Joseph T. ....

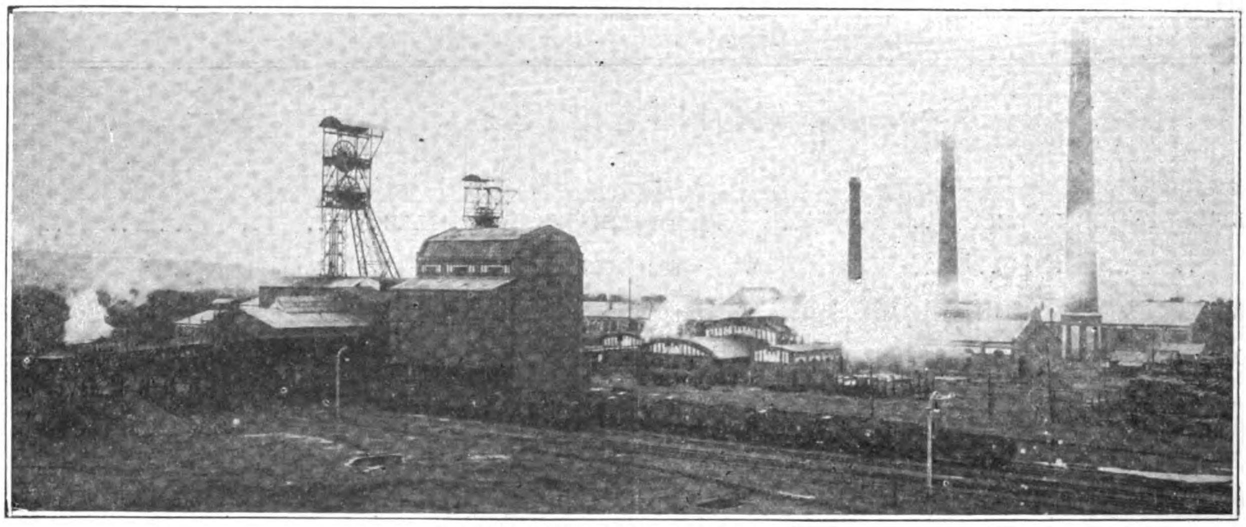
Sale & Frazar, Ltd. 16
Scottish Tube Co., Ltd.............. 8
Selson Engineering Co., Ltd......... 63
Shanghai Dock & Eng. Co., Ltd...... 32
Shanghai Municipal Council 4
Shantung Railways 70
Simons & Co., Ltd., Wm. 14
Smith, Major & Stevens, Ltd. 33
South Manchuria Railway Co. 64, 68, 69
Standard Oil Co. of N. Y. 29
Sulzer Bros. 39
Sumitomo.......................... 58
Sumitomo Bank, Ltd. 58
Superheater Co., The 71

Thornycroft & Co., John I........... 1
Toshin Soko 40
Toyo Kisen Kaisha 45
Transatlantische Handels-Kompagnie, m.b.h. 72
Trimont Manufacturing Co. 9

United Brassfounders & Engineers, Ltd. 61
United Cigarette & Machine Co. 41
United States Steel Products Company........... 23, 37, Back Cover

Walworth International Co. ......Cover
Wharton Jr. & Co. Inc., Wm. 21
Whittall & Co., Ltd., J. 6
Wild & Co., M. B. 9
Williams & Co., J. H. 7

Yarrow & Co., Ltd................Cover
Yokohama Dock Co. Ltd. 33
Yokohama Specie Bank, Ltd.......Cover



The Tzuchuan Colliery, Shantung

TZUCHUAN COAL

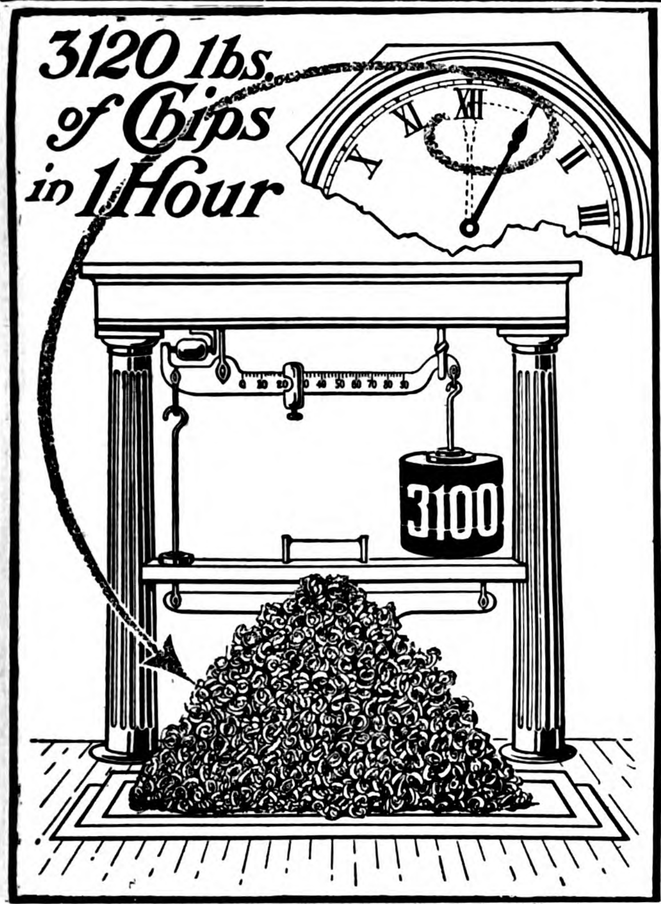
The Cheapest and Best Coal Mined in the Far East

Annual Output: 600,000 tons.
The Coal is washed, screened, and classified for the market into five grades, viz., Lump, Slack, and Washed Coal Nos. 1, 2 and 3.
Tzuchuan Coal contains a large amount of coke, with only a small amount of ash, and has a heating capacity of 7,500 calories.
Tzuchuan Coal, which rivals the best Cardiff Coal, is highly recommended for Coke and Briquette manufacture, for Boiler and Marine use and for General Domestic use
Tokuyama Briquette Factory, Yawata Iron and Steel Works, and many other important works in Japan and China are constant purchasers.
The Wharves at Tsingtao are well accommodated as Coaling Stations for Coast and Ocean liners.

For further information please apply to the

SHANTUNG RAILWAY ADMINISTRATION

Cable Address: "SANTETSU" TSINGTAO, CHINA **Codes: A.B.C. 5th Ed. & A.1.**



Agents: Andersen, Meyer & Co., Ltd., Shanghai and Manchuria
Horne Co., Ltd., Tokio, Japan
H. P. Gregory & Co., Sydney & Melbourne
Pacific Commercial Co., Manila, P.I.
Honolulu Iron Works, Honolulu, H.I.

Increase Production

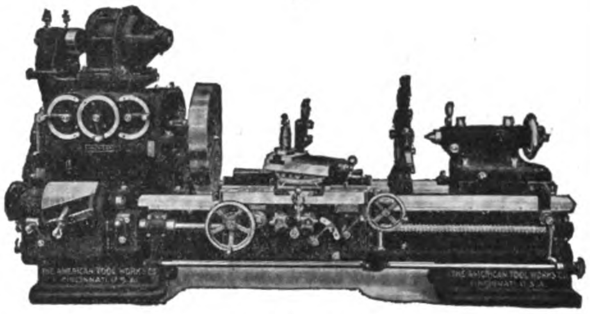
Lower Your Costs

"American" Lathes by virtue of their tremendous power and ruggedness are increasing production and lowering shop costs in hundreds of plants all over the world.

Think of a 30-inch lathe removing steel at the rate of 3120 lbs. per hour! That indicates the "American" Lathe's productive capacity.

Not only are "American" lathes unusually powerful, but their workmanship is such as to insure permanent accuracy and long life under severe conditions.

Write immediately for our Efficiency Bulletin



THE AMERICAN TOOL WORKS COMPANY

Lathes-Planers CINCINNATI, U.S.A. Shapers-Radials

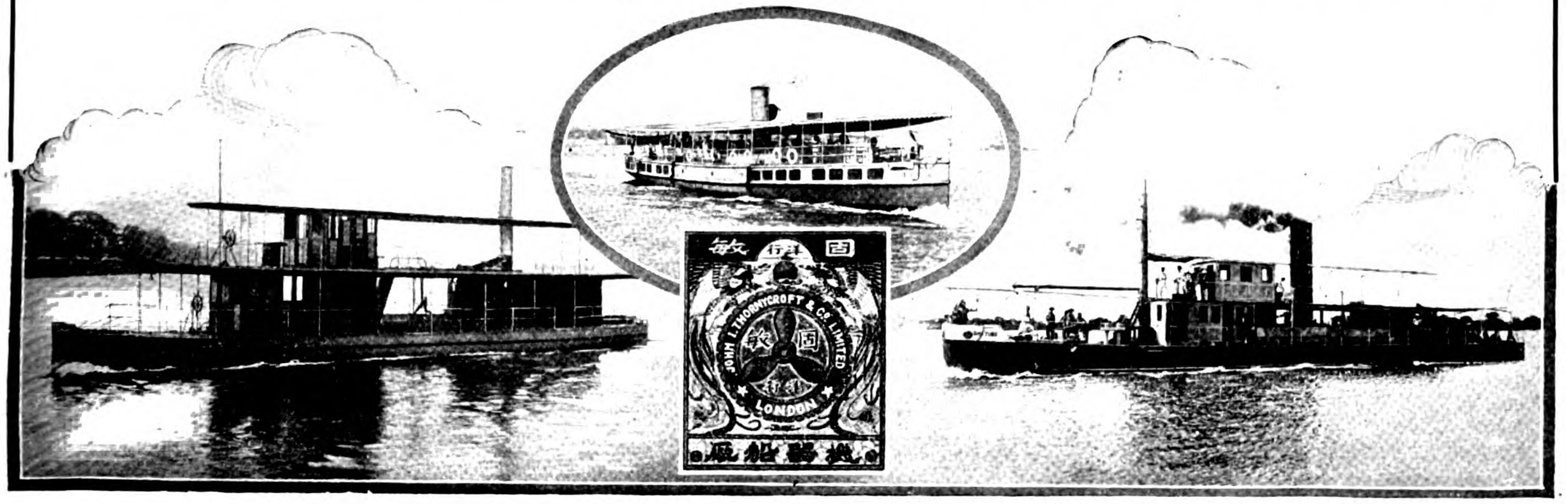
JOHN I. THORNYCROFT AND CO., LIMITED

ENGINEERS & SHIPBUILDERS

All types of Shallow Draft, River and Ocean Craft, Steam or Motor Propelled, Side Wheel, Stern Wheel or Tunnel Stern, War Vessels, Submarines, Cruisers, Cargo and Passenger Vessels to 5,000 tons, Motor Boats to 40 knots.

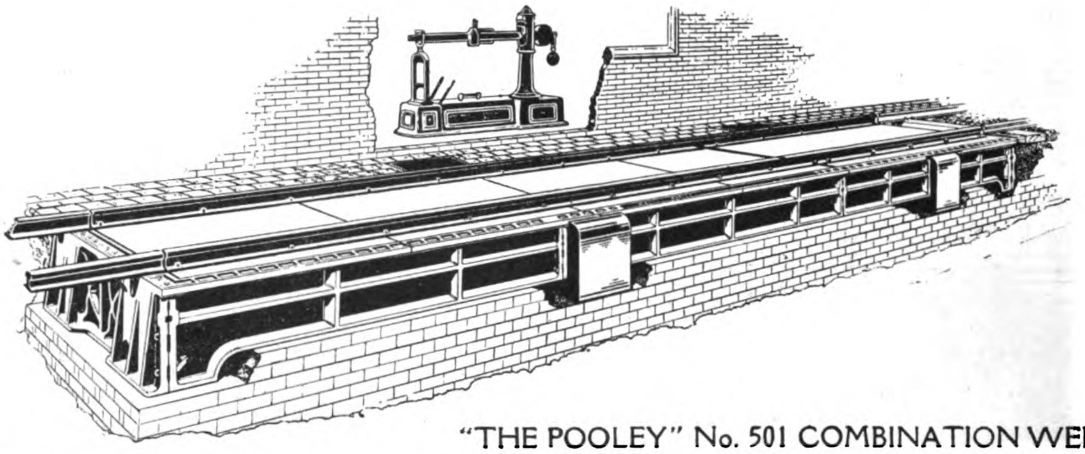
Water Tube Boilers, Steam Turbines, Marine Engines, Oil Fuel Gear, Propellers. The "Thornycroft" Oil Fuel Sprayer, Marine Motors, from 15bhp. for Petrol or Paraffin, Stationary Oil Engines for Lighting, Pumping, and Power Plants.

10 Kiukiang Road, SHANGHAI :: Thornycroft House, Westminster, London, S.W.1. & Southampton, England



POOLEY

WEIGHING MACHINE & WEIGHBRIDGE MAKERS



"THE POOLEY" No. 501 COMBINATION WEIGHBRIDGE, CAPACITY 70 TONS, SPECIALLY DESIGNED FOR CHINA.

HENRY POOLEY & SON LTD
JOHN BRIGHT ST
BIRMINGHAM
ENGLAND

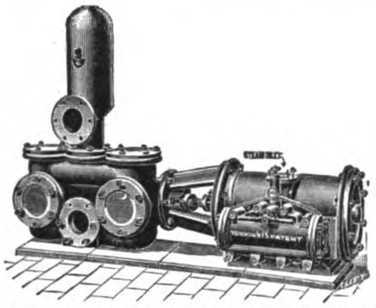
P.A. 123.

WE MANUFACTURE

PUMPS

FOR EVERY PURPOSE

To be worked by HAND, STEAM, BELT, WIND, WATER or ELECTRIC POWER.



STEAM PUMP for General Purposes

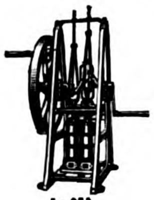
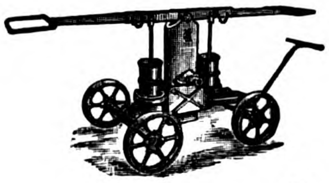
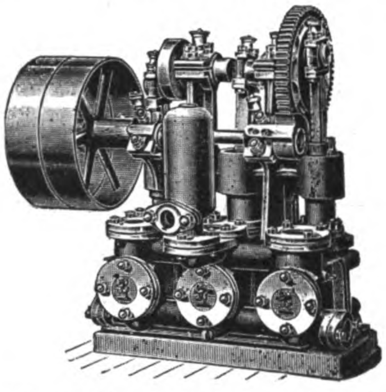
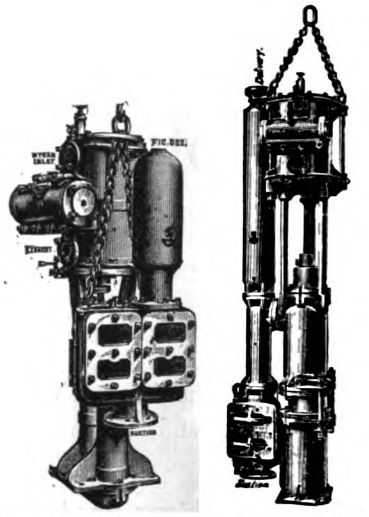


Fig. 323.

Fig. 160.







SINKING PUMPS for COLLIERIES, MINES, Etc.

Fig. 121.

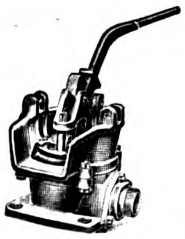


Fig. 185.

Write for "Eastern" List.

JOSEPH EVANS & SONS

(WOLVERHAMPTON) LTD

CULWELL WORKS,

WOLVERHAMPTON, ENGLAND.

Agents for China

J. WHITTALL & CO., LTD.

16 Victoria Terrace
Tientsin

12 Nanking Road
Shanghai

33 Ta Juan Fu Hutung
Peking

Stocks Kept in Tientsin and Shanghai.

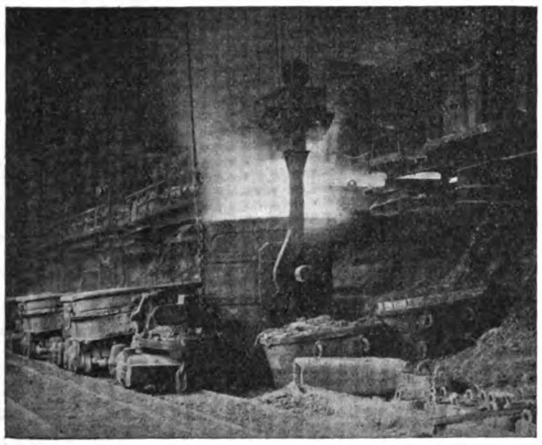
DORMAN, LONG & Co., Ltd.

Steel Manufacturers,
Bridge Builders & Constructional Engineers,

MIDDLESBROUGH, ENGLAND.

Telegraphic Address:
"DORMAN-MIDDLESBROUGH."

Codes —
BENTLEY'S; A.B.C. (5th and 6th Editions) and WESTERN UNION (Universal & 5 Letter).

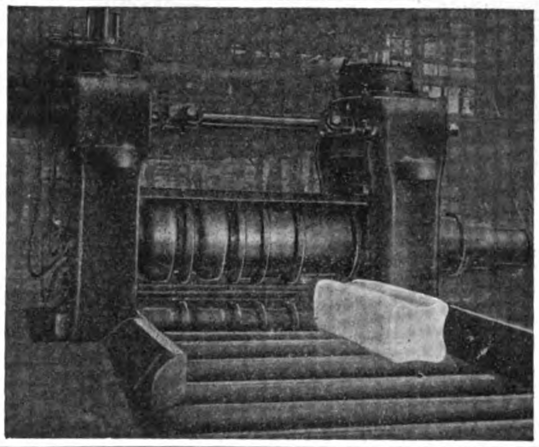


Britannia Steelworks,
MIDDLESBROUGH.

Open-Hearth STEEL JOISTS, ANGLES and OTHER SECTIONS, RAILS.

Open-Hearth STEEL BARS in long lengths suitable for

FERRO-CONCRETE WORK, BILLETS AND BLOOMS.



Redcar Iron and Steel Works, Redcar.

Steel Works and Rolling Mill Dept.

Plate Mills capable of Rolling all Plates for **Shipbuilding and Engineering** purposes, from 3/16" to 1½" thick, fulfilling the requirements of British Standard Tests, Board of Trade, Admiralty, Lloyds, etc.

Universal Plates with Rolled Edges 12" to 42" wide up to 90-ft. long.

Clarence Steel Works and Rolling Mills,
PORT CLARENCE.

High-class Steel in quality from Dead Soft to 1.25 per cent. Carbon for the manufacture of Wire, Springs, Files, Saws, Forgings, Stampings, Rifle Barrels, Agricultural Implements, etc. Conductivity Steel to stand General Post Office, India Office and British Railway Tests.
Electrically Melted Steels of all Carbons.

NICKEL ALLOY STEEL.

Flange and Bulb Head Rails, Billets, Slabs, etc.

Ayrton Rolling Mills,
MIDDLESBROUGH.

Galvanized Corrugated and Plain Sheets,

Ridging, Gutters, Downpipes, Fountain Heads, etc.

Ordinary Galvanized Fittings kept in Stock.

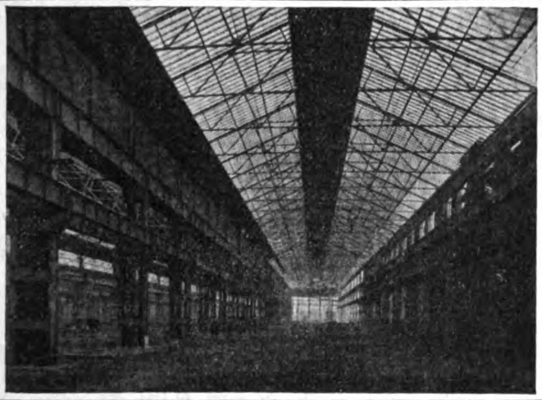
Cleveland Wire Mills,
MIDDLESBROUGH.

Wire Rods and all kinds of Wire for all purposes. Telegraph & Telephone Wire. Annealed Core Wire. Galvanized Seizing Wire. Galvanized Rigging Wire. Galvanized & Varnished Fencing Wire. Galvanized Strand & Barb Wire. Galvanized Cable Wire.

Galvanized Patent Steel Hawser Wire to Lloyd's Tests.

Bright Patent and Plough Steel Rope Wire.

The Mills can supply the **longest single length** of Rods or Wire without weld or joint of anyone in the Trade.



Constructional Department,
MIDDLESBROUGH.

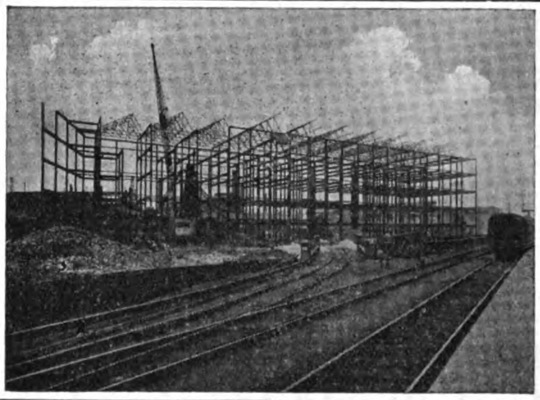
STRUCTURAL STEELWORK

for all purposes.

Speciality:

STEEL FRAME BUILDINGS

for home and abroad.



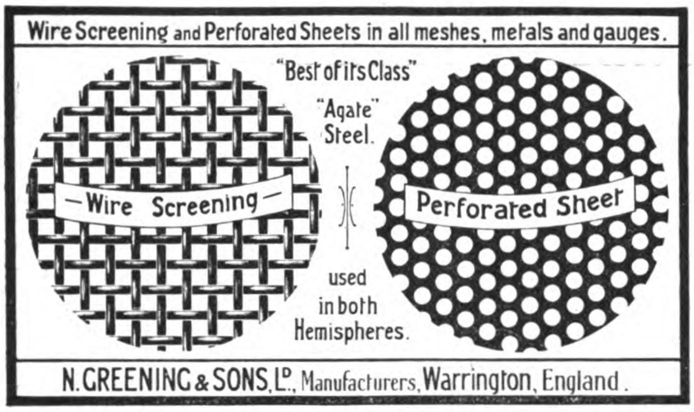
AGENTS:—

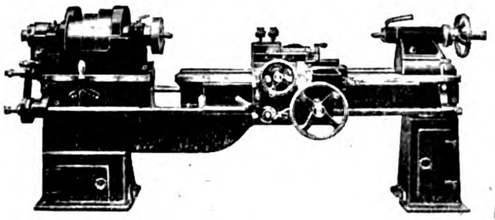
REPRESENTATION for BRITISH MANUFACTURERS, LTD.

CHING MING BUILDINGS, BRITISH CONCESSION, HANKOW.

43 KIANGSE ROAD, SHANGHAI.

REGINES BUILDINGS, LEGATION STREET, PEKING.





HEAVY DUTY LATHES

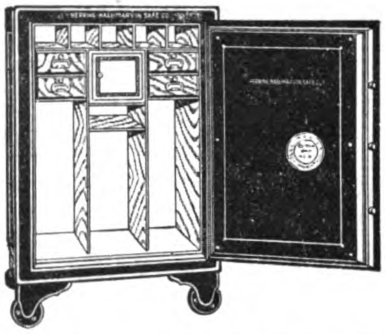
7-in. and 9-in. Centres

HIGH-CLASS MACHINES AT MODERATE PRICES

S. W. CLOUGH

REDBURN LATHE WORKS

SHIPLEY, Eng.



Unfailing Protection For Your Most Valued Possessions

HERRING-HALL-MARVIN

Safes and Bank Vaults

All sizes from the smallest Home Safe to the largest Bank Vaults, Key-Lock or Combination.

MUSTARD & COMPANY

Sole Agents for China, Hongkong and Macao.

Shanghai, Tientsin, Hankow, Hongkong, Canton, Harbin.

THE

MUNICIPAL ELECTRICITY DEPARTMENT

HAS RECEIVED DEMANDS FOR

ELECTRIC POWER

AMOUNTING TO

80,000 HORSE POWER

AND PLANS TO INCREASE ITS GENERATING PLANT TO A CAPACITY OF

180,000 HORSE POWER

? DO **YOU** THINK

IT IS POSSIBLE TO MAKE YOUR OWN POWER AT A COST WHICH CAN COMPETE

WITH THE **CHEAP RATES** MADE AVAILABLE

BY THE OPERATION OF THIS VAST MODERN POWER PLANT? ?

ASK

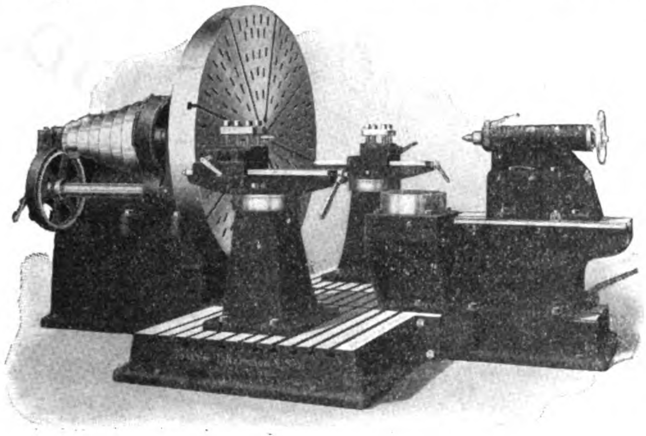
THE POWER DEPARTMENT, FOOCHOW ROAD, SHANGHAI

TELEPHONE FOR AN APPOINTMENT TO CENTRAL 283.

RYERSON

Ryerson-CMC Standard Face Plate Lathe

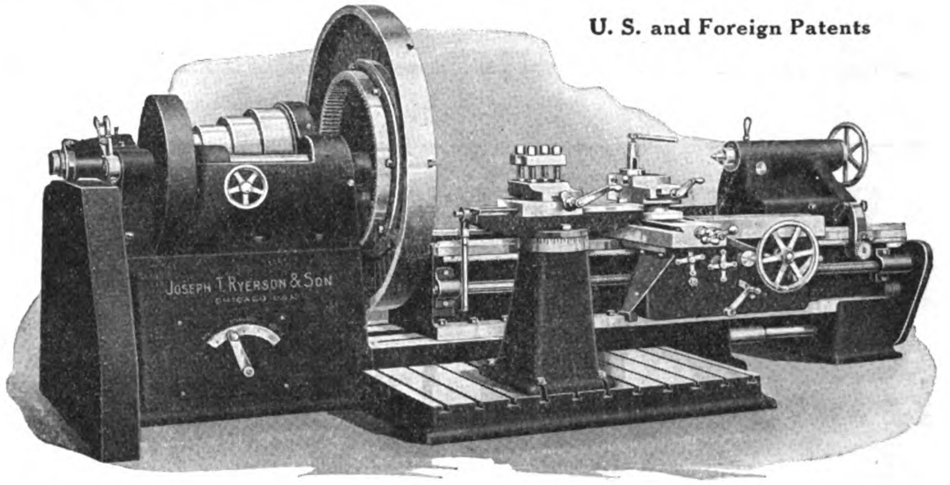
U. S. and Foreign Patents



The Ryerson-CMC Standard Face Plate Lathe is specially designed for turning turbine and generator housings, large pulleys, flywheels, etc. This machine has two tool rests so that two tools may be used, one at the front and one at the back of the machine. Special driving dogs may be attached to the face plate for holding the work to be turned. We build this machine in three sizes, to swing over bed, maximum of 73", 85" and 98".

Ryerson-CMC Extension Bed and Break Lathe

U. S. and Foreign Patents



This triple geared lathe has been especially designed for universal machine work in shipyards, large repair works, etc., where a great variety of turning work is to be handled. The moving bed is deep and rigid and of box section. The face plate carrying a pillar rest is substantially designed and provided with slots for bolting the pedestal. We manufacture break lathes in three different sizes, with swing over bed of 74", swing over V's, 37", swing over saddle, 24"; also 86" x 42" x 30" and 98" x 50" x 37" with any required length of moving bed.

JOSEPH T. RYERSON & SON

ESTABLISHED 1842

NEW YORK
BUFFALO

CHICAGO, ILL., U. S. A.

ST. LOUIS
DETROIT

Cable Address: Ryson, Chicago. Telegraphic Codes: Western Union, Lieber's, A. B. C. (5th Edition), Bentley's, Ryerson

29

TRADE MARK S

CABLE ADDRESS: "SUGAR," TOKYO
CODE: A.B.C. 5TH EDITION
Head Office:
No. 12 Sanchome, Kakigara-Cho,
Nihonbashi-Ku, TOKYO

RAW **SUGAR** REFINED

THE JAPAN SUGAR CO., LTD.
(DAI NIPPON SEITO KABUSHIKI KAISHA)
CAPITAL: YEN 18,000,000; PAID-UP: YEN 12,000,000

TRADE MARK S

J. WHITTALL & CO., LTD.

TIENTSIN — ENGINEERS AND MERCHANTS SPECIALISTS IN — PEKING

MINING, RAILWAY AND TEXTILE MACHINERY

Agents in North China for:

HADFIELDS, LTD.
Mining and Light Railway Material of all Kinds

BELLIS & MORCOM, LTD.
Engines, Turbines, Condensers and Air Compressors

CROMPTON & COMPANY, LTD.
Electrical Generators and Motors

JOHNSON & PHILLIPS, LTD.
Electrical Cables and Transformers

M. B. WILD & COMPANY, LTD.
Winding and Hauling Machinery

HOWARD & BULLOUGH, LTD.
Textile Machinery and Cotton Mill Accessories

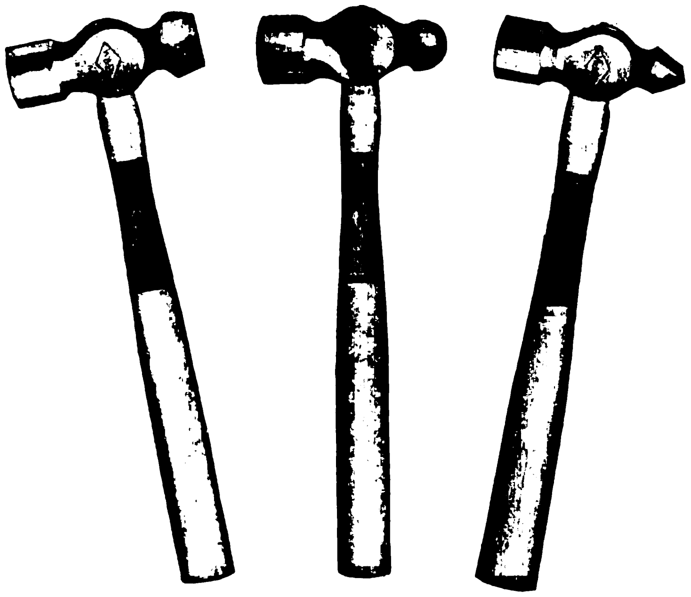
WARRINGTON WIRE ROPE WORKS, LTD.
Steel Wire Ropes

JOSEPH EVANS & SONS, LTD.
Mining Pumps

LEWIS BERGER & SONS, LTD.
Paints

Codes : Engineering 2nd Ed. A.B.C., 5th Ed. Bentley's: Kendall's: Scholfields: Private

Telegrams: "Whittal."



MADE IN CANADA

WILLIAMS' SUPERIOR DROP-FORGED HAMMERS

Are dependable tools because :—

Their heads, drop-forged from a special grade of tough steel, carefully hardened and tempered, neither crack, chip nor splinter.

They are fastened most securely and solidly to the handles—can't work loose—can't fly off.

Their handles are made of the best grade of clear, straight-grained hickory, flared at the grip to prevent hand-slip.

The weight and length of each tool are properly proportioned to give perfect balance, and, hence, increased striking power.

Williams' Superior Hammers of all kinds and sizes.
Catalog on request.

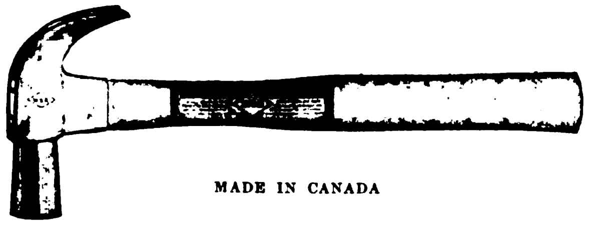
J. H. WILLIAMS & CO., Ltd.

"The Drop-Forging People"

Works : St. Catharines, Canada

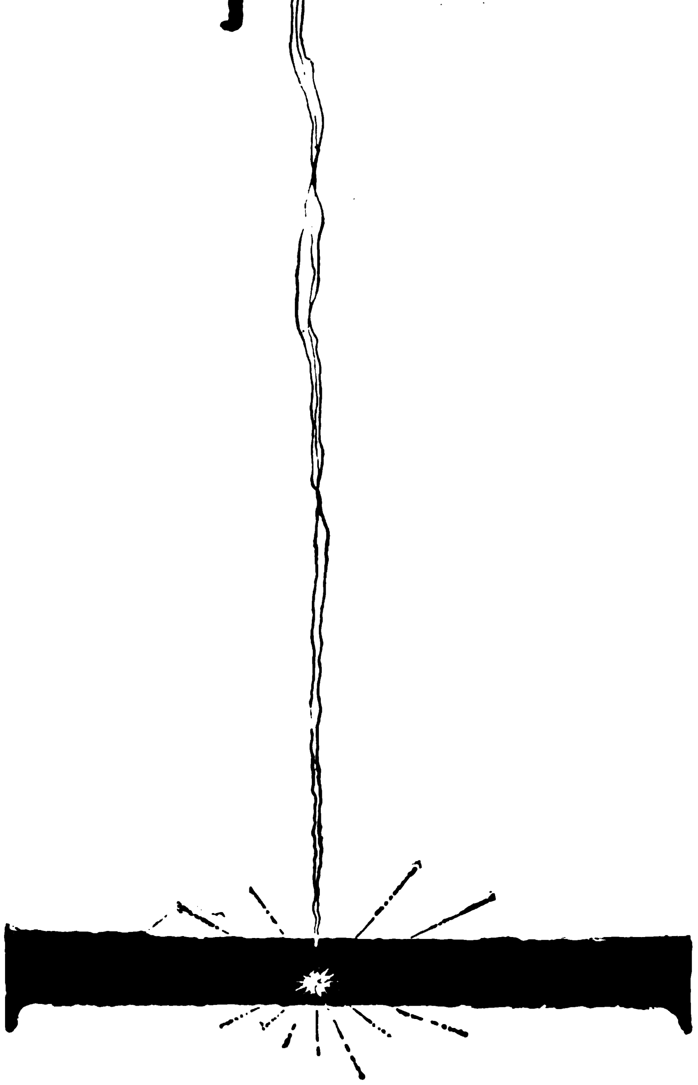
Export Office:
124 State Street,
New York, U.S.A.

London Representative :
Benj. Whittaker, Ltd.,
Department K.
56 Ludgate Hill, E. C. 4.



MADE IN CANADA

A falling spark



A single unheeded spark, falling upon inflammable material, may grow into a dangerous and destructive fire. But where the

GRINNELL
AUTOMATIC SPRINKLER AND FIRE ALARM

is installed no fire can spread or endure: it is quenched surely and automatically.

Mather & Platt, Ld.

Park Works,
MANCHESTER

14 Great Smith Street,
LONDON, S.W.

47 SZECHUEN ROAD, SHANGHAI

TUBES

IRON, STEEL, BLACK, GALVANISED

BOILER TUBES

Gas Water and Steam Tubes and Fittings
Boring & Casing Tubes
Tubular Coils for Heating and other Purposes.

STC

Sole Licensees in Great Britain for the Manufacture of

"ARMCO" Rust and Corrosion Resisting Iron Tubes

Write for Descriptive Pamphlet

THE SCOTTISH TUBE CO., LTD.

Head Office: 34 Robertson Street, GLASGOW.

Branch Offices—London, Manchester, Leeds, Liverpool, Newcastle-on-Tyne, Cardiff, Sydney, N.S.W.; Wellington, N.Z., Johannesburg, Cape Town and Durban, S.A.

Works—Glasgow, Govan, Coatbridge, Rutherglen and Garnkirk.

Telegraphic Address: "Scotubeco" Glasgow. Codes: A1, A.B.C. (4th & 5th Editions), Lieber's, Bentley's, Western Union and Private.

The Pneumercator Tank-Gauge

(PATENTED)

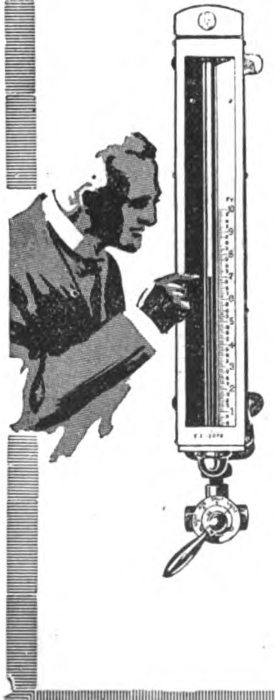
Measures and Weighs

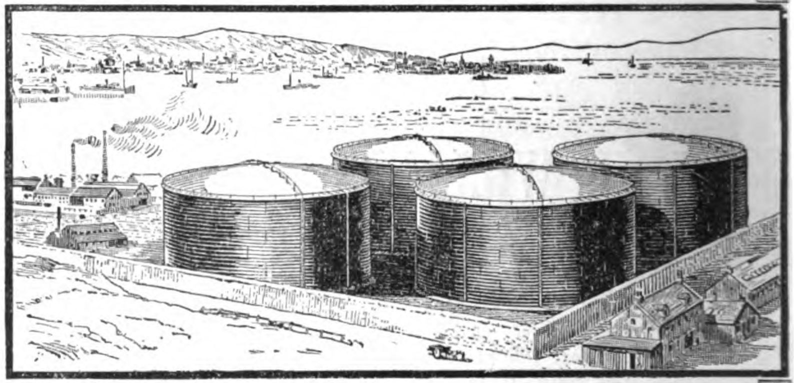
FUEL OIL

or Any Liquid,
in Any Tank,
at Any Distance

Unaffected by Changes of Temperature.

NO FIRE RISKS.





WRITE FOR DESCRIPTIVE BOOKLET.

Sole Manufacturers for GREAT BRITAIN and EUROPE, INDIA, CHINA, AUSTRALIA, NEW ZEALAND, SOUTH AFRICA, ARGENTINE REPUBLIC, CHILE

KELVIN BOTTOMLEY & BAIRD LTD

KBB

MANUFACTURERS OF THE LATE LORD KELVIN'S INVENTIONS AND OTHER INSTRUMENTS

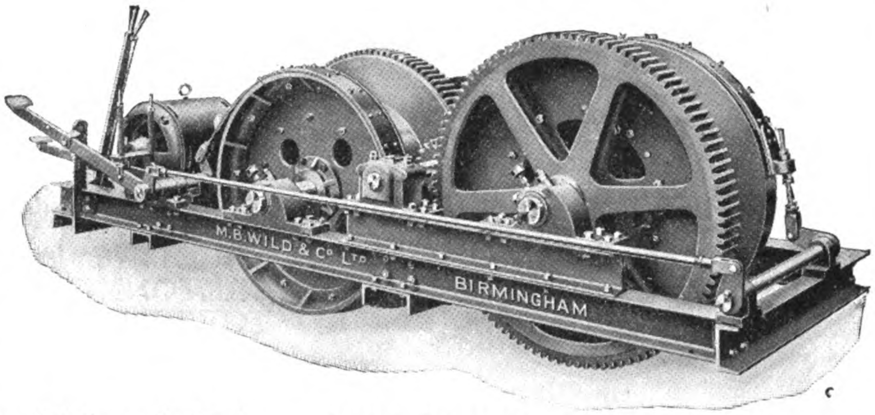
18 CAMBRIDGE ST. GLASGOW

ELECTRIC HAULAGE MACHINERY

REGISTERED TRADE MARK

WE have been specialising on this class of machinery continuously for 20 years and have gained a large number of satisfied customers. Repeat orders have been received from many. Immediate delivery is offered of our Standard Haulages up to 100 h.p. and a Price List will be sent upon application.

Enquiries for particular requirements carefully studied and designs submitted.



15 H.P. Double Drum-Tandem Haulage

M. B. WILD & CO., LTD., BIRMINGHAM., ENGLAND

AGENTS:

J. WHITTALL & CO., LTD.

SHANGHAI TIENTSIN PEKING

TEL. ADD.: "WHITTALL" TIENTSIN
14, 16 & 18 VICTORIA TERRACE,
TIENTSIN

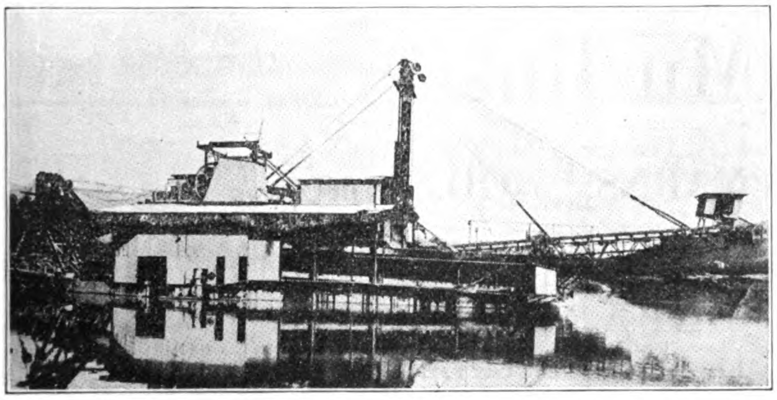
TEL. ADD.: "WHITSHANG" SHANGHAI
KELLY & WALSH BLDG.,
SHANGHAI

TEL. ADD.: "WHITTALL" PEKING
32 TA JUAN FU HUTUNG,
PEKING

"BUCYRUS"

TRADE-MARK Registered

EXCAVATING MACHINERY



7 cu. ft. Tin Dredge Working for Tin Bentong no Liability in the Federated Malay States

Bucyrus Dredges are Working in All Parts of the World Recovering Gold, Tin and Platinum.

The Largest Placer Dredge Ever Built was Ordered from Bucyrus Company in the Face of World-Wide Competition.

40 Years Experience in Manufacturing Excavating Machinery.

BUCYRUS COMPANY

South Milwaukee, Wisconsin, U.S.A.

Cable Address: "BUCYRUS, SOUTH MILWAUKEE"

London Office: BUCYRUS COMPANY, 19, Iddesleigh House, Caxton Street, Westminster.

Agents in Siam: D. Couper-Johnston & Co., Bangkok, Siam.

Agents in India: McLeod & Co., Calcutta and Bombay, India.

Agents in Malay States: The Borneo Company, Ltd., Singapore, S.S.

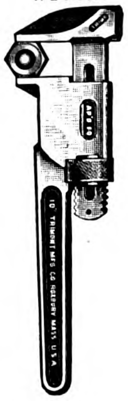
TRIMO WRENCHES

Pipe Wrench

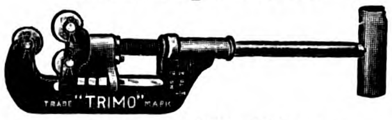
Supplied with steel frames that do not break, nut guards that keep the adjusting nut from being turned accidently in close quarters, and inserted jaws in end of handle that can be removed when worn, saving the handle.

There are other superior points that every user of Trimo Pipe Wrenches knows—all for economy to the user.

Nut Wrench

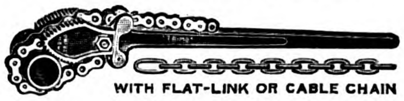


Trimo Pipe Cutter



As a 1 or 3 Wheel Cutter

Trimo Chain Wrench



WITH FLAT-LINK OR CABLE CHAIN

TRIMONT MFG. CO.,

Roxbury (Boston), Mass.

JAPANESE

TEXTILES

FOR EXPORT

Standard Printed and Dyed Cotton and Silk Fabrics

SHIRTINGS SHEETINGS DRILLS
PRINTS CRETONNES FLANNELETTES
DAMASKS TOWELING CREPES
ETC. ETC.

PONGEES BROCADES SATINS
CREPES SILKS

FUJI GASSED SPINNING COMPANY, LIMITED
(FUJI GASU BOSEKI KABUSHIKI KAISHA)

Head Office:
GOCHOME, OSHIMA-MACHI
NEAR TOKYO
CABLE ADDRESS: "FUHO"

CAPITAL - Yen 38,000,000
OPERATING
450,000 Spindles and
1,775 Looms

Business Office:
SHICHOME, HAKOZAKI-CHO,
NIHONBASHI-KU,
TOKYO

Silks, Crepes, Brocades, Cotton Cloths, Muslins

SILK AND COTTON YARNS, NOILS, etc.

OUR EXPORT DEPARTMENT
IS REPRESENTED IN ALL THE IMPORTANT COMMERCIAL CENTERS OF THE WORLD AND CAN FURNISH PROMPTLY FULL INFORMATION AND QUOTATIONS REGARDING THE LARGE VARIETY OF TEXTILES MADE IN OUR MILLS

KANEGAFUCHI SPINNING COMPANY, LIMITED
HIGASHI-SHIRIIKE, KOBE, JAPAN

Consolidated Steel Corporation

25 Broadway, New York, U.S.A.

SHANGHAI OFFICE : GLEN LINE BUILDING, 1-A PEKING ROAD, SHANGHAI
TOKYO OFFICE : JAPAN OIL COMPANY BUILDING, NO. 1 YURAKUCHO
ITCHOME, MARUNOUCHI, TOKYO.
CALCUTTA OFFICE : 6 HASTINGS STREET
BRANCH OFFICES AND REPRESENTATIVES IN PRINCIPAL COUNTRIES THROUGHOUT THE WORLD

CABLE ADDRESS: CONSTECO, NEW YORK

Cable Codes: Consolidated Steel Corporation, Western Union, A B C Fifth Edition Improved, Scott's 10th Edition, Bentley's Complete Phrase, Lieber's

SOLE EXPORTER OF THE COMMERCIAL PRODUCTS OF

BETHLEHEM STEEL COMPANY
BRIER HILL STEEL COMPANY
CAMBRIA STEEL COMPANY
LACKAWANNA STEEL COMPANY
LUKENS STEEL COMPANY
MIDVALE STEEL & ORDNANCE COMPANY
REPUBLIC IRON & STEEL COMPANY
SHARON STEEL HOOP COMPANY
TRUMBULL STEEL COMPANY
WHITAKER-GLESSNER COMPANY
YOUNGSTOWN SHEET & TUBE CO.

CONSTECO

TRADE MARK

We invite and will give prompt attention to inquiries for all forms of iron and steel products, including the following:—

PIG IRON Basic, Bessemer, Foundry, and Malleable.

SEMI-FINISHED STEEL Ingots, Billets, Blooms, Slabs, Skelp and Sheet Bars.

RAILWAY MATERIAL Rails with Complete Accessories; Standard, Girder, Guard and High T-Rails; Steam and Electric Railway Frog and Switch Material; Special Track Work, including Switch Stands. Tires, Steel Tired Wheels, Rolled Steel Wheels; Locomotive and Car Axles, Loose and Mounted; All Steel Passenger Cars; Open Freight and Tank Cars; Forged Steel Locomotive and Car Parts; High Speed and Carbon Tool Steels.

STRUCTURAL STEEL For Bridges, Buildings, Cars, Locomotives, Ships, etc.
Plates, Sheared and Universal Mill, for Tank, Boiler, Ship, Firebox, Steel Bottom, etc.
Angles, both Standard and Bethlehem, Special Sections, Channels, Shapes and Beams.
Piling—Consteco-Lackawanna Sheet Piling (manufactured by Lackawanna Steel Company).
Bars—Merchant Steel, Reinforcing, Refined Iron, Double Refined Iron, Staybolt Iron, Tool Steel, etc.
Fabricated Structural Steel for Bridges, Buildings, Towers and other Structures.

TUBULAR PRODUCTS Boiler Tubes, Lapwelded, Open-Hearth Steel and Genuine Knobbled Charcoal Iron; English Standard Steel Tubes, Gas and Steam Weights; Black and Galvanized and Red Painted American Standard Full Weight Pipe, American Standard Extra Heavy Pipe, Black and Galvanized. Line Pipe, Drive Pipe, Drill Pipe, and Oilwell Tubing. Standard Lapwelded and Special California Casing, Rigid and Flexible Electric Conduit.

SHEET AND TIN MILL PRODUCTS Galvanized, Flat and Corrugated Steel Sheets, Blue Annealed Sheets, Shovel Sheets, One Pass Cold Rolled Close Annealed Black Sheets, Enamelling Stock, Deep Drawing and Extra Deep Drawing Stock and Copper Bearing Sheets. Coke Tin Plate, Best Cokes, Full Finished Tin Mill Black, Taggers and Dairy Stock, Terne Plate.

WIRE PRODUCTS Wire Rods of Bessemer and Basic Open Hearth Steel, both Low and High Carbon. Bright, Soft, Bright Hard Drawn, Black Annealed, Galvanized, and Coppered Round Steel Wire. Galvanized Barbed Wire, Galvanized Staples, Wire Nails, etc.

FLAT STEEL PRODUCTS Hoops, Bands, Hot Rolled Strip, Cold Rolled Strip.

SPECIAL PRODUCTS Forgings, Castings, Toolsteel, Alloy Steels, Special Steels, Circular Sections, etc.

BOLTS AND NUTS Rivets, Track Bolts, Spikes, Turnbuckles and Washers.

MACHINERY Machine Tools, Planers, Horizontal Boring Machines, Hydraulic Presses Complete, Pumps and Pumping Engines, Railway Shop Machinery, Shipyard Machinery, Rolling Mill Machinery and Equipment, and any other Special Machinery Designed to order.

Jardine, Matheson & Co., Ltd.

CANTON | HANKOW | ICHANG | TIENTSIN
CHENGTU | HARBIN | PEKING | TSINGTAO
CHUNGKING | HONGKONG | SHANGHAI | ETC.

Engineering Show Room: 8A YUEN-MING-YUEN ROAD, SHANGHAI

Sole Agents for Associated British Machine Tool Makers, Limited.

Comprising the following Firms :—

JAMES ARCHDALE & CO., LTD, Birmingham.
WILLIAM ASQUITH, LTD., Halifax.
J. BUTLER & CO., Halifax.
THE CHURCHILL MACHINE CO., LTD., Manchester.
DEAN, SMITH & GRACE (1908), LTD., Keighley.
KENDALL & GENT, LTD., Manchester.
JOHN LANG & SONS, LTD., Johnstone, Glasgow.
J. PARKINSON & SON, Shipley.
GEO. RICHARDS & CO., LTD., Broadheath, Manchester.
THOMAS SHANKS & CO., Johnstone, Glasgow.
SMITH & COVENTRY, LTD., Manchester.
H. W. WARD & CO., LTD., Birmingham.

The full range of Machine Tools manufactured by this combination is as follows:

LATHES

Sliding Surfacing and Screwcutting Lathes, Plain Lathes, High Speed Lathes, Axle Lathes, Toolroom Lathes, Surfacing and Boring Lathes, Vertical Boring Lathes, Cutting-off Lathes, Heavy Forge Lathes, Gun Lathes, Shafting Lathes, Break Lathes, Wheel Lathes, Relieving Lathes, Capstan, Turret and Brassfinishers Lathes of all types. Chucks and Self-opening Dieheads.

DRILLING MACHINES

Radial Vertical Drills of all sizes. Girder, Portable and Multiple-spindle Radials, Pipe-flange Drilling and Facing Machines, Ball-bearing Sensitive Multiple Drills and High-speed Drilling Machines.

MILLING MACHINES

Plain, Vertical, Horizontal and Universal Milling Machines, Plano-Milling Machines, Keyway and Slot Drilling Machines, Thread Milling Machines.

PLANING AND SHAPING MACHINES

Planing Machines in all sizes. Armour-plate Planing Machines, Pillar and Traversing Head Type Shaping Machines, Spiral Bevel Gear Planers, Side Planing Machines, etc.

BORING MACHINES

Horizontal Boring Machines, Special Boring Mills for Turbine Casings, Tyre Boring Machines.

GRINDING MACHINES

Twist Drill Grinding Machines, Cylindrical Grinders, Crank Shaft Grinders, Cam Grinders, Universal Chucking Grinders, Internal Grinders, Piston Ring Grinders, Wet Tool Grinders, Cutter Grinders, etc.

SLOTTING MACHINES

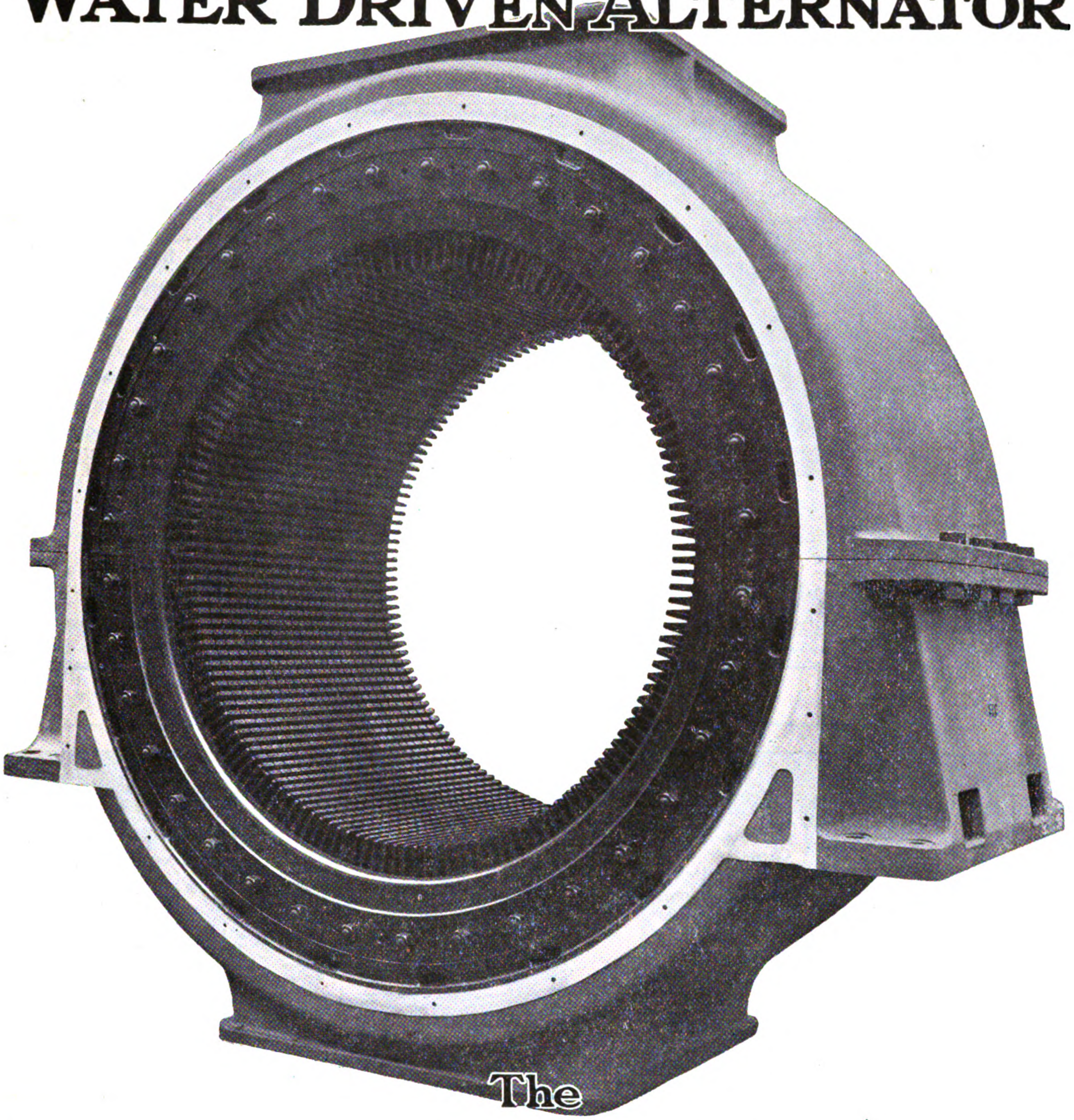
All types including High Speed and Portable Slotting Machines.

MISCELLANEOUS

Cutting-off Machines, Bolt Screwing Machines, Gun-boring, Lapping and Rifling Machines, Centring and Facing Machines, Nut Facing Machines, Universal Sharpening Machines, Mandrel Presses, Sand Blasts, Air Compressors, Broaching Machines, Twist Drills and Vices of all kinds.

ENQUIRIES SOLICITED

10,000 H.P.
WATER DRIVEN ALTERNATOR



The

ENGLISH ELECTRIC
Company Limited.

WORKS:-

DICK, KERR WORKS, PRESTON. ORDNANCE WORKS, COVENTRY.
PHŒNIX WORKS, BRADFORD. SIEMENS WORKS, STAFFORD.
WILLANS WORKS, RUGBY.

HEAD OFFICE:-

Queen's House, Kingsway, London, W.C. 2.

TELEPHONE — — — — — — — — — — — — — — — HOLBORN, 830.

China Office: JARDINE, MATHESON & CO., LTD., Engineering Dept., 8a Yuen-Ming-Yuen Road, Shanghai
Japan Office: ENGLISH ELECTRIC CO., LTD., 3 Itchome, Uchisaiwaicho, Kojimachi-Ku, Tokyo

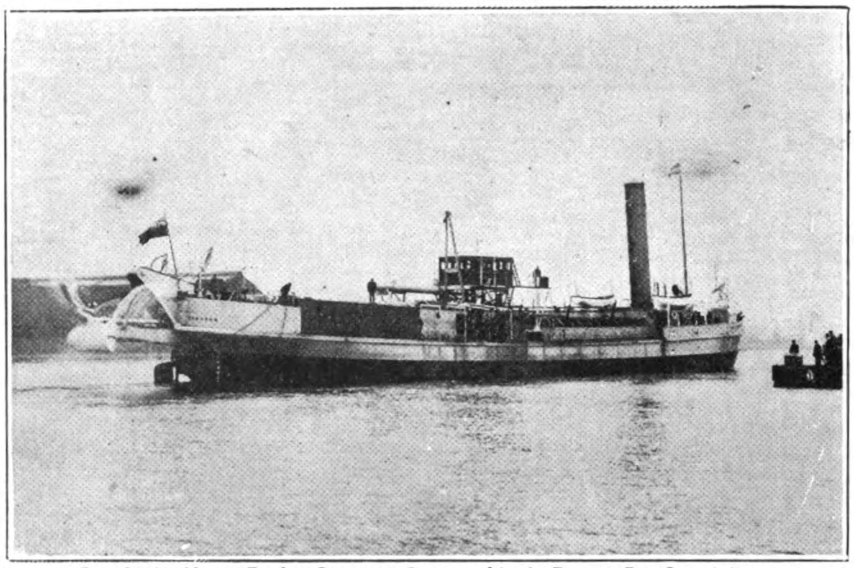
Wm. Simons & Co., Ltd., Renfrew

CONSTRUCTORS OF

Marine Dredging Plant

of most Modern and Improved Types and of the Greatest Capacities.

Constructors of Barge Loading, "Simons" Reclamation, Canal and Suction Cutter Hopper Dredgers. Hopper and Barge Loading Bucket Dredgers. Alluvial Dredgers. Trailing Suction Dredgers.



Drag Suction Hopper Dredger *Cormorant*, Constructed for the Rangoon Port Commissioners

Propelling and Dumb Hopper Barges.

Replace Parts supplied or fitted to existing Dredgers.

Inventors and First Constructors of "Hopper" and "Sternwell" Dredgers and Elevating Deck Ferry Steamers.

Head Office and Works: Renfrew, near Glasgow.

Telegrams: "Simons" Renfrew. **Established 1810**

Aeroplane Steels
Air Separators
Automatic Measures
"Stag" Ball Mills
Forged Steel Balls
Railway Buffers
£ s. d. Carbon Tool Steels

Cement Plant
Case-Hardening Steel
Steel Castings
Chrome Vanadium Steel
Circular Saws
Coalcutter Steel
Crushing Rolls
Cubing Rolls

Hydraulic Cylinders
Crossings, Special High-Speed Steel Discs
Carbon Tool Steel Discs
Disintegrators
Dressing Machines
Dredger Buckets

Dredger Pins & Bushes
Revolving Dryers
Dynamo-Magnet Steel Castings
Cast Steel Files
Steel Gearing
Granulators

Branch Office in Japan:
EDGAR ALLEN & Co., Ltd.
2 Mitsu Bishi Buildings.
1 Yaesu Cho, Kojimachi-Ku,
TOKYO

Edgar Allen & Co. Ltd
Imperial Steel Works
Sheffield

Agents in China:
JARDINE MATHESON
and Co., Ltd.,
8a Yuen Ming-Yuen Road,
SHANGHAI.
Also at
Hankow, Tientsin, Peking, etc.

Hammers
Helmets, Shrapnel-proof
High-Speed Steel
Iron-Ffbred Steel
Lathe Tools
"Imperial" Manganese Steel
Mechanical Feeders

Milling Cutters
Miners' Drill Steel
Mining Steels
Motor-Car Steels
Nickel-Chrome Steel
Nickel Steel
K 9 Oil Hardening Steel

Ore Crushers
Permant. Magnet Steel
Points, Rly and T'way
Pulverizing Cylinders
Railway Special Track.
Reamers.
Rotary Kilns

Screening Plant.
Shoes and Dies.
Slurry Separators.
Spring Steel.
"Stag" Stonebreakers.
T'mway Special Track.
Tube Mills.
Twist Drills.

AVERY

The Importance of accuracy.

THE PARAMOUNT FACTOR IN ALL WEIGHING OPERATIONS, IS ACCURACY.

IT IS VITALLY IMPORTANT WHERE ESTIMATES OF VALUE, ARE DETERMINED BY WEIGHT.

LOSSES DUE TO UNRECORDED INACCURACIES ARE UNRECOVERABLE, THEREFORE THE VALUE OF ACCURACY IS INDISPUTABLE.

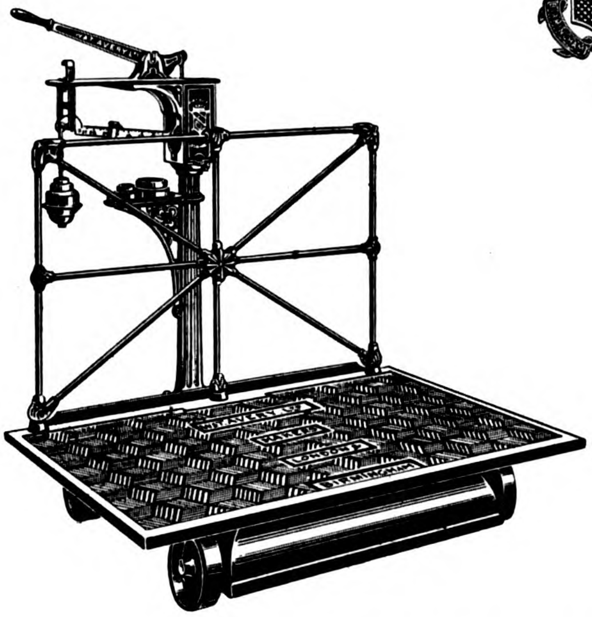
THE HIGH DEGREE OF ACCURACY AND ALL-ROUND EFFICIENCY OF

AVERY MACHINES

IS "PRACTICAL REASON" WHY THEY MAINTAIN SUPREMACY IN THE MARKETS OF THE WORLD

Agents:

JARDINE, MATHESON & CO., LTD.
SHANGHAI.



W. & T. AVERY LTD
SOHO FOUNDRY
BIRMINGHAM, ENGLAND.

A.0.476.

CANADIAN CARBIDE GIVES MORE GAS PER POUND

AND GAS IS WHAT YOU ARE BUYING

Export Drum with Wood over Cask

Years of manufacturing experience, plus facilities for quantity production assure highest gas yield and moderate prices.

CANADA CARBIDE CO., LTD.

Power Building, MONTREAL, CANADA.

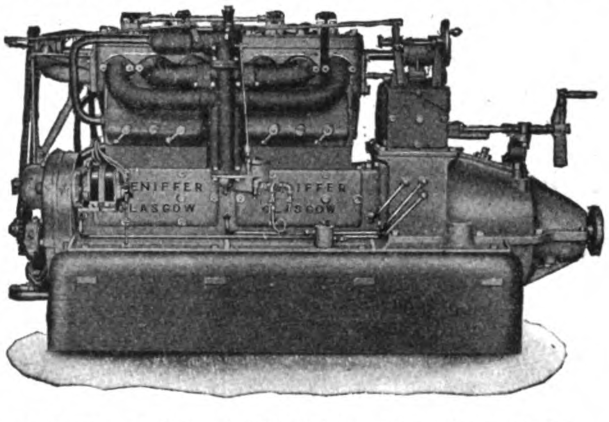
Manufacturers and Exporters of

"S" BRAND HIGH-GRADE CARBIDE OF CALCIUM

Cable Address: CARBIDE, Montreal, Canada
Western Union, Bentley's and A.B.C. 5th Edition Codes.

GLENIFFER

KEROSENE & PETROL MARINE MOTORS



FOR ALL TYPES OF BOATS

RANGE OF MODELS—10 TO 90 H.P.

AGENTS:—Douglas and Grant Ltd.—at Madras, Rangoon, Bangkok, Saigon, and Haiphong.
Ritchie and Bisset—at Singapore.
British and Dutch Engineering Co., Ltd.—at Batavia and Soerabaia.

GLENIFFER MOTORS LTD.

ANNIESLAND, GLASGOW, SCOTLAND.

TELEGRAMS: "GLENGINE, GLASGOW."

SALE & FRAZAR

LIMITED

No. 1 Yayesucho, Kojimachi-Ku

TOKYO

Central Post Office Box No. 18

IMPORTS — EXPORTS

Telegraphic Address: "FRAZAR" For All Offices has

Since 1834 The Name "FRAZAR" has been Connected

WITH

ORIENTAL TRADE

BRANCHES - - - - Yokohama, Kobe, Osaka, Kyoto, Moji, Hakodate, Nagoya, Keijo (Korea), Taihoku (Formosa), Mukden (Manchuria), Vladivostok (Siberia.)

AFFILIATED COMPANIES -
- FRAZAR & CO., 30 Church St., New York, and Paris, Seattle, San Francisco.
- FRAZAR TRUST CO., LTD., Tokyo and Yokohama.
- FRAZAR FOREIGN TRADE BUILDING CO., New York.

CORRESPONDENTS - -
- SALE & CO., 21 Old Broad St., London, E.C.
- F. G. SALE & SONS, 20 Bishops Gate, London, E.C.
- E. W. FRAZAR & CO., 5 Rue de Paris, Tientsin and Peking, Harbin, Mukden.

WORLD-WIDE CONNECTIONS

EXCLUSIVE AGENCIES IN ALL LINES

LARGE STOCKS

A FEW OF OUR AGENCIES

MANY OTHER EXCLUSIVE AGENCIES

MOTORCARS, TRUCKS, TRACTORS, ETC. Ford Motor Co., Hupmobile Motor Car Corp., Franklin Motor Car Co., Armstrong Siddeley Co., Ltd., Rolls Royce Co., Ltd., The White Co. (Trucks), Splitdorf Electrical Co.
MACHINE TOOLS. Joseph T. Ryerson & Son, Giddings & Lewis Mfg. Co., Wm. Sellers & Co., Inc.
RAILWAY EQUIPMENT. Baldwin Locomotive Works, W. H. Miner, Griffin Wheel Co., Duff Mfg. Co.
AVIATION EQUIPMENT: Handley Page, Ltd.
BRITISH STEEL and STEEL PRODUCTS. Jonas and Colver, Ltd., Smith & Coventry, Ltd., Sheffield Twist Drill & Steel Co., Ltd., Chubb & Son's Lock & Safe Co., Ltd.
CANNING MACHINERY and EQUIPMENT. American Can Co., Adriance Machine Works, Anchor Cap & Closure Co., Burpee and Letson Ltd., Seeley Brothers.
CANNED SALMON and CRAB from Kamchatka.
Fairbanks Morse & Co. Stationary and Marine Engines. Motors, Pumps, Wind Mills, complete Power and Lighting Plants.
Chain Belt Co., "Rex" Concrete Mixers.
J. L. Mott Iron Works, Plumbing Fittings and Supplies.
Shepard Electric Crane & Hoist Co., Cranes and Hoists.
Armour & Co., Canned Meats and Fruits, Soaps, Toilet Articles.
The Carnation Milk Products Co., "Carnation Cream."
The Glidden Co., Paints, "Jap-a-lac" Auto Finishes, Cold Water Paints, Wood Stains.
The Duratex Co., "Duratex" Leather Substitute and Rubber Coated Top and Curtain Materials.
S. C. Johnson & Son, Floor Wax, Paste, Liquid, and Powder.
The Klein Manufacturing Co., Technical Paints "Metal Crete" Concrete Hardeners, Cement Coating.
The Tungsten Wire Works (Stockholm), Wires for Filaments.
The Victor Talking Machine Co., Machines and Records.
The Graphoscope Development Co., Projectors and Films.
The Victor Typewriter Co., Standard Typewriters.
The Corona Typewriter Co., Folding Typewriters.
The Rolex Watch Co., Ltd., "Rolex" Watches.
Simmons Hardware Co., "Keen Kutter" and "Oak Leaf" Brands of Tools and Cutlery.
The Gillette Safety Razor Co., "Gillete" Blades.
ROAD, EXCAVATING, POWER HOUSE, REFRIGERATING MACHINERY: STEEL and IRON PRODUCTS: "Gould" STORAGE BATTERIES.
RADIO APPARATUS, HEATING EQUIPMENT, FERTILIZERS, SAWN TIMBER CHEMICALS.
OUR SERVICE also covers BONDS and INVESTMENTS, FIRE and MARINE INSURANCE, SHIPPING, STORING, CHARTER, SALE and PURCHASE of STEAMERS.

INQUIRIES SOLICITED - If we cannot Supply your Requirements from Stock, we will be pleased to Recommend Local Alternatives or Advise Regarding Imports.

FIREPROOF
Ambler
Asbestos Corrugated Roofing

Made of selected asbestos fibres and the best hydraulic cement, compressed into compact sheets under three thousand pounds pressure per square inch, Ambler Corrugated Roofing and siding cannot burn, rust, rot, split nor leak. Made in sheets twenty-seven and one-half inches wide with eleven complete corrugations, and in lengths of four, five, six, seven, eight, nine and ten feet to be applied directly on purlins with lead washers and either bolts or aluminium tie wires, furnished. This material is unaffected by heat or cold or climatic conditions. Send for our data sheets showing method of use. Address all inquiries to Export Department "B."

"Permanent as the Everlasting Hills"

NO PAINTING—NO REPAIRING

Manufactured by

**Asbestos
Shingle, Slate & Sheathing
Company**

Ambler, Penna., U.S.A.

Distributors Wanted throughout the East

Cable Address: " IWASAKISAL-TOKYO "

Code Used : A. 1., A.B.C. 5th, Western Union, Bentley's Complete Phrase

MITSUBISHI SHOJI KAISHA, LTD.

(MITSUBISHI TRADING CO., LTD.)

Capital, fully paid-up - - - Y. 15,000,000

Head Office:

MARUNOUCHI, TOKYO.

Importers and Exporters, Manufacturers, Commission Merchants, Brokers, Ship Owners.

EXPORTING:

Coal, Copper and all Other Descriptions of Metals, Minerals and Cereals, Chemicals, Oil, Paper, Glass, Canned Fish, Silk Goods, and General Oriental Products and Merchandise

IMPORTING:

Iron, Steel, Machinery, Machine Tools, Chemicals, and General Merchandise

ANNUAL PRODUCTION:

Electrolytic Copper Ingots	20,000	Tons
Pig Iron	100,000	,,
Steel	50,000	,,
Coal	3,500,000	,,

COLLIERIES:

Takashima, Ochi, Yoshinotani, Kishidake, Namazuta, Shinnew, Hojo, Kanada, Kamiyamada, Ashibetsu, Bibai, O-Yubari, and Sakito

BRANCHES and AGENCIES:

Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle

STEAMSHIP DEPARTMENT—KOBE

Fleet Owned	25,000	Tons Gross
Chartered Steamers	12,000	,, ,,

Regular and Irregular Routes between home ports and Chinese and South Sea Islands Ports, etc.

MIIKE COAL

The Finest Steaming and Bunker Coals of the Far East are mined from the famed Miike, Tagawa, Yamano Sunakawa and Kawakami Collieries operated by the

MITSUI

MINING COMPANY, LTD.

HEAD OFFICE:

No. 1 Surugacho, Nihonbashi-Ku, TOKYO, JAPAN

Capital - - Yen 100,000,000

Annual Coal Output is equal to one-quarter of Total Japanese Mines.

LEAD, SILVER, GOLD, ZINC, COPPER, SPELTER, SULPHUR, COKE, IRON, CHEMICALS and DYES

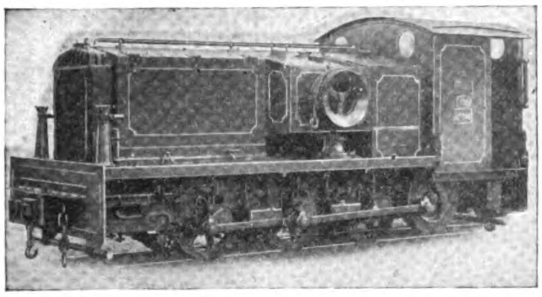
Are produced from the Company's, KAMIOKA, Lead, Silver and Zinc Mine; SANO, Copper and Zinc Mine; KUSHIKINO, Gold Mine; KONGO, Tungsten Mine; IWAONOBORI, Sulphur and Metal Mine; Zinc Plants, Coke, Dyestuffs and By-products Establishments in Miike.

Sole Agents for our Products:

MITSUI BUSSAN KAISHA, Ltd.

(MITSUI & Co., Ltd.)

Tokyo, London, New York, Shanghai, Hongkong, and other Principal Commercial Centres of the World.



Contractors to: The Admiralty, The War Office, The India Office, The Crown Agents for the Colonies, Colonial and Foreign Governments

Internal Combustion Rail Cars, Inspection Cars, Coaches, Tramcars, Trailers, Locomotives, Tractors, etc.

British built throughout and supplied to upwards of 200 Railways in all Parts of the World

Designs to meet individual requirements

Passenger Freight Shunting
Mining Harbours Docks
Plantations Logging Contractors

The Drewry Car Co., Ltd.

(and McEwan Pratt & Co., Ltd.)

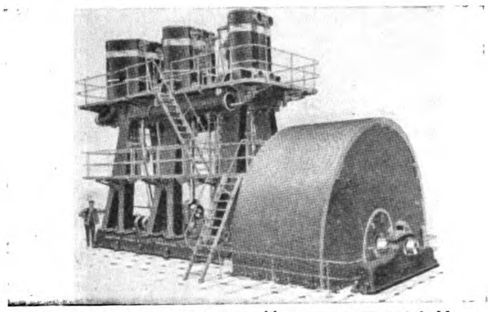
13 South Place, London, E.C. 2

Telegrams: "Effervesce, London"

Works: Burton-on-Trent, England

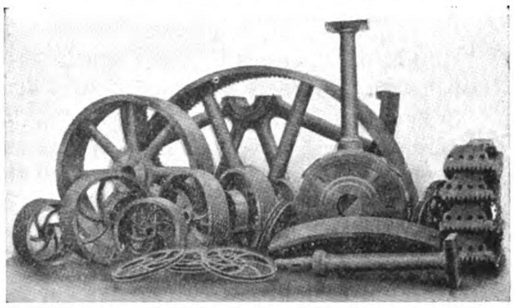
ASHTON FROST & CO., LTD.

ESTABLISHED 1873.



MAKERS OF

STEAM ENGINES,
MILL GEARING,
DEEP WELL PUMPS,
SEWAGE PLANT,
ETC.

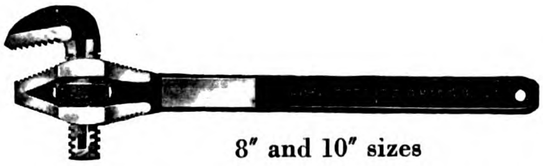


TELEGRAMS: "FOUNDRY."

WORKS: **BLACKBURN, ENG.**

Little Giant—The New Pipe Wrench

14″ and larger sizes



8″ and 10″ sizes

A new design which gives increased strength, increased simplicity, increased usefulness, *less* weight, and fewer parts.
The "*Little Giant*" Pipe Wrench has become popular at once because of the end opening jaws. It can be thrust straight on a pipe like a pair of pliers, and will be found useful in places which are beyond the reach of an ordinary pipe wrench.

The arrangement of the jaw, which can be engaged at will with 2 or 4 sets of teeth on the handle can be seen in the picture. These extra sets of teeth mean long life. The "*Little Giant*" Wrench is drop-forged and heat-treated throughout.
Merchants will be particularly interested in the light weight (less than an ordinary pipe wrench) and the few parts. The "*Little Giant*" has only 3 parts, which means a smaller investment in replacements. Any of our representatives will be glad to quote prices.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASS., U.S.A.

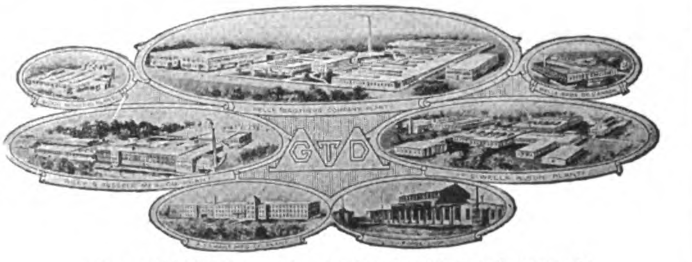
Canadian Plant: Greenfield Tap & Die Corporation of Canada, Limited, Galt, Ontario.
Cable address: "Getede"

MULLER, PHIPPS & SELLERS, LTD.
17 Itachibori Kitadori 5-chome, Nishi-Ku
Osaka, Japan
Fudo Bank Bldg., 9.2-chome
Honkokucho, Nihonbashiku
Tokyo, Japan

MULLER & PHIPPS (CHINA) LTD.
5 Ice House St.
P. O. Box 25, Prince's Bldg., Hongkong, China
1 B Jinkee Road
Shanghai, China

DODGE & SEYMOUR (CHINA) LTD.
89-91 Rue Montauban, Shanghai, China

HORNE COMPANY LTD.
63 Rue de Baron Gros, Tientsin, China
6-7 Takayama-cho
Kyobashi-Ku
Tokyo, Japan



Plants of GTD Corporation, World's Largest Manufacturers of Screw-threading Tools

The Green Island Cement Co., Ltd.

SHEWAN, TOMES & CO.,

GENERAL MANAGERS, HONGKONG

Are You Going to Build?

Insist on your Architect specifying the use of the best brand of Portland cement in construction. If the house or factory is to be blocks or tiles, they should be of concrete, if stucco, only the best cement should be employed; if reinforced concrete is used, only a standard cement will stand the test; if your building is to be fireproof, waterproof, safe against earthquake or typhoon, improving with age, and lowering the cost of insurance, you must employ concrete, and the best concrete construction is only secured through the use of

Green Island Cement

Green Island Cement is supplied in Bags = 250-lbs. net, Casks = 375-lbs. net, Iron Drums = 375-lbs. net.

Also, Glazed Stoneware, House Drains, Sewer Pipes, and Fittings, Paving Bricks, Tiles, Fire Bricks and Fire Clay.

The Green Island Brand has become the standard Portland Cement of Asia, owing to its purity, uniformity and tests.

Used by H.B.M.'s Government in Hongkong, United States Government in the Philippines for all important Public Works.

Also by H.B.M.'s Government in Singapore and Federated Malay States for Government Buildings, Railways and Harbour Works.

Established 1883 **Telegraphic Address "ROPEWORK," HONGKONG**

THE HONGKONG ROPE MANUFACTURING Co., Ltd.

Manufacturers of Pure Manila Hemp Rope

Rope supplied to the British Navy on the China Station and to all Mail and regular Steamship Lines.

Ropes, Cables and Hawsers ½-in. to 15-in. Circumference. Driving Ropes for Mills; Bull Ropes and Drilling Cables for Oil Wells a Specialty.

SHEWAN, TOMES & CO.

General Managers

St. George's Building **HONGKONG.**

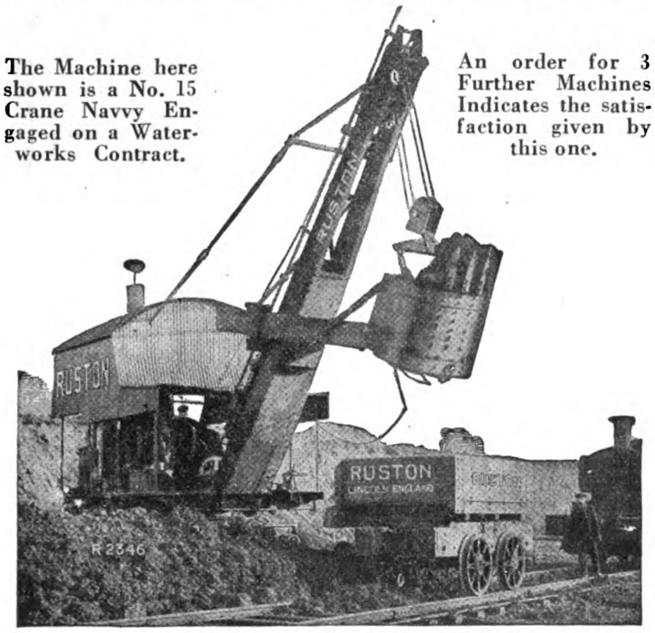
ECONOMICAL EXCAVATIONS

RUSTON EXCAVATORS—Crane Navvies Shovels, and Draglines have proved their efficiency on all classes of excavations in all parts of the world.

Wide Range of Machines available on Rail Wheels, Road Wheels or Caterpillar Tracks.

The Machine here shown is a No. 15 Crane Navvy Engaged on a Waterworks Contract.

An order for 3 Further Machines Indicates the satisfaction given by this one.



Full particulars from:—

RUSTON & HORNSBY LTD., LINCOLN, England.

OR

MARTIN & CO., CALCUTTA.
ARNHOLD BROTHERS & CO., LTD., SHANGHAI.
UNITED ENGINEERS LTD., SINGAPORE.

The JANNEY-PENN Coupler

THE latest development of the Janney type of M. C. B. Coupling originally introduced and promoted by this company. This coupler has all the simplicity of the early type of the Janney coupler, and also has the up-to-date features of a "Lock-to-the-Lock," "Lock-Set," and a "Knuckle-Opener," and complies fully with all the requirements and recommendations of the M. C. B. Association of the U. S. A.

This coupler has the desirable feature of easy accessibility of parts, thus facilitating the making of repairs.

Furnished with various designs of rear end to suit different types of Draft Rigging.

Manufactured exclusively by

THE McCONWAY & TORLEY CO.

Pittsburgh, Pa., U. S. A.

Cable Address—Torley, Pittsburgh

China Agents: The Fearon, Daniel Co., Tientsin, Peking, Hankow and Shanghai, China

FOR GASES CHARGED AT HIGH PRESSURES

Seamless Steel Cylinders

For oxygen, acetylene, hydrogen, carbonic acid, nitrous oxide, sulphur dioxide, liquid chlorine, blaugas, etc.

Furnished complete with or without caps and valves. Built strictly to British and American specifications, insuring absolute safety. Prompt shipments.

This company is a subsidiary of the Taylor-Wharton Iron & Steel Co., established 180 years ago, manufacturers of manganese steel rails, frogs, switches gears, rolls, dippers, buckets, crushing and mill machines, etc.

Its seamless steel cylinders are noted for their toughness and ductility, the caps and valves are carefully and accurately constructed, and in every respect they represent the highest quality of material and workmanship.

Representatives Desired

We desire to correspond with high-grade concerns and individuals in regard to representing us. Our facilities, in both manufacture and service, our reputation, stability and the worth of our products make the opportunity a desirable one. Please give full particulars.

Wm. Wharton, Jr. & Co., Inc.

(Founded 1859)

30 Church St., New York, U. S. A.

Cable, Wilwharton, New York

FAMOUS FACTORIES NOBEL'S WORKS AT ARDEER

A portion of the Factory of NOBEL'S EXPLOSIVES Co. LTD. (a constituent Company of NOBEL INDUSTRIES LTD.) at Stevenston, Ayrshire, on the Firth of Clyde.

This photograph, taken from the air, shows a portion of the Factory where Blasting Explosives are made. The whole area, on the original site selected by Alfred Nobel in 1871, now covers 850 acres. The term "Factory" is to some extent a misnomer, as the works include hundreds of distinct and widely separated houses, which together form the largest organisation in the world for the manufacture of explosives. Those buildings in the danger area are separated from the remainder, being surrounded by high mounds of sand, which would isolate the effect of an explosion.

The interests of NOBEL INDUSTRIES LTD., although largely concerned with the manufacture of dynamite, gelignite, blasting powder and other explosives and accessories, are by no means confined to these products. They also cover the manufacture of naval, military, and sporting ammunition and powders; non-ferrous metals, and metal manufactured goods; power presses; industrial collodions; gas mantles; bicycles and accessories; artificial leathers, etc., etc. Particulars can be obtained from—

NOBEL INDUSTRIES LIMITED

Head Office :

NOBEL HOUSE, LONDON, S.W. 1.

Write to the Advertising Department, Nobel House, for illustrated booklet "The Products of Nobel Industries, Ltd." mentioning this Journal.

Agents for Explosives and Ammunition: Jardine, Matheson & Co., Ltd., Hongkong, Shanghai, Peking and Tientsin.

UNITED STATES STEEL PRODUCTS COMPANY

30 Church St., New York, U.S.A.

Sole Exporters of the Products of

Carnegie Steel Company
Illinois Steel Company
American Steel & Wire Company
American Steel & Tin Plate Company
The Lorain Steel Company
American Bridge Company
National Tube Company
Tennessee Coal, Iron & Railroad Company
Minnesota Steel Company
Canadian Steel Corporation
Chickasaw Shipbuilding and Car Company

BRANCH OFFICES and REPRESENTATIVES IN

Antwerp, Belgium
Birmingham, England
Bombay, India
Brussels, Belgium
Buenos Aires, Argentine Republic
Calcutta, India
Cape Town, South Africa
Christiania, Norway
Concepcion, Chile
Glasgow, Scotland
Havana, Cuba
Johannesburg, South Africa
Lima, Peru
Los Angeles, California
London, England
Mexico City, Mexico
Montreal, Canada
New Glasgow, Canada
New Orleans, La
Paris, France
Peking, China
Portland, Oregon
Rio de Janeiro, Brazil
Rome, Italy
Rotterdam, Holland
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Seattle, Washington
Soerabaya, Java
Sydney, New South Wales
Tokio, Japan
Toronto, Canada
Valparaiso, Chile
Vancouver, Canada
Winnipeg, Canada

WAREHOUSES AT

Antwerp, Belgium
Bombay, India
Buenos Aires, Argentine Republic
Calcutta, India
Callao, Peru
Cape Town, South Africa
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Talcahuano, Chile
Valparaiso, Chile

We give prompt attention to inquiries for all class of our Steel Products, including the following :—

Aerial Tramways—Reversible, specially designed
Alloy Steel
Alloy Steel Sheets
Ammonia Cylinders
Angles
Armatur Sheets
Axles—Locomotive, Railroad and Tramway Cars

Bamboo Steel
Barbed Wire
Bars—Steel, Concrete Reinforcement
Billets
Black Sheets
Blooms
Boiler Tubes, Lapwelded, Seamless
Bolts and Nuts
Bridges—Railway, Highway, specially designed
Buildings—Steel Warehouses, Structural Steel for Buildings

Cables—Steel Hoisting and Hauling Cables
Cars—Steam Railway, Mine and Industrial Railway Cars
Car Angles
Car Wheels
Circular Steel Poles
Cold Rolled Flat Wire
Copper Rail Bonds
Copper Steel Sheets

Derricks
Drilling Machines
Drilling Rigs for Oil Wells
Duguesne Rail Joints

Electrical Sheets
Electrical Wires and Cables

Fabricated Structural Material for Bridges, Turntables, Steel Buildings, etc.
Fencing Materials—Wire Fencing, Steel Posts
Forgings
Frogs and Switches—Steam and Electric Railways

Hoops and Bands

Machine Forgings
Mine Timbers

Nails and Spikes
Nail Wire

Pig Iron
Piling—Steel Sheet
Pipe—Black and Galvanized Wrought, for Steam, Gas and Water: American or English Lapwelded Boiler Tubes. Matheson Lead Joint Pipe. Seamless Steel Tubing
Plates—Boiler, Tank, Ship, Flange and Fire Box Steel
Poles—Steel Tubular

Rails—Light and Heavy Rails for Railways, Tramways, Mine and Industrial Railways. Special Track Work
Reinforcement for Concrete—Triangle Wire Mesh
Rivets
Rope—Wire for Mine Hoists, Derricks, Cranes, etc.

Screw Spikes
Screw Stock—Cold Drawn
Shafting
Shapes—Standard Structural
Sheet Bars
Sheets—"Apollo" Brand, Plain, Galvanized, Corrugated, Black
Skelp
Slabs
Spikes—Railway Track Spikes
Sleepers—Steel
Spring Steel
Steam Pipe and Tubes
Stove Pipe Skeebs
Switches—Switch Stands

Tank Plates
Terne Plates
Tin Mill Products
Tin Plate—" Coke," " Charcoal " and " Terne "
Tool Steel
Towers—Steel
Triangle Mesh Concrete Reinforcement
Tubes—Gas, Water, Steam
Turntables for Light and Heavy Railway Service

Upholstery Springs

Washers
Weatherproof Insulated Telephone and Signal Wire
Wheels—Solid Wrought Steel for Steam, Electric, Mine and Industrial Railways.
Wire Products—Plain, Galvanized, Bright Hard. Bright Soft, Baling and Fencing. All Classes of Coated and Uncoated for Manufacturing Purposes.

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE: Union Building—The Bund and Canton Road

PEKING OFFICE : No. 22 Wu Liang Ta Jen Hutung

TOKYO OFFICE : No. 15 Nakadori, Marunouchi

OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President:
Baron K. Okura

BRANCHES at Hakodate, Yokosuka, Yokohama, Osaka, Kobe, Maizuru, Kure, Moji, Saseho, Keelung, Taihoku, Seoul, Antung, Penhsihu, Mukden, Tientsin, Peking, Hankow, Changsha, Kiukiang, Tsingtau, Hongkong, Vladivostok, Sydney, San Francisco, New York, London.

Head Office:
Ginza, Tokio

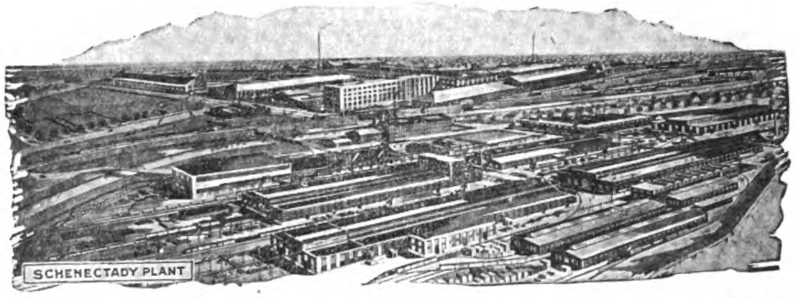
GENERAL IMPORTERS AND EXPORTERS

Rails, Bridges, Locomotives and other Railway Supplies
Electric Plants, Electrical Supplies
Sugar Plants, Spinning Machinery, Machine Tools
Factory Equipments, and all kinds of Machines
Automobiles, Guns and Explosives
Structural Materials, Steel Materials, Metals
Mineral Products, Chinese and Japanese Produce, Silk
Cotton, Wool, and their Manufactures
Fertilizers, Chemicals, Vegetable Oils and Wax, Dye Stuffs
Food Stuffs, Hides and Fur, Skins, Pen-hsi-fu Smokeless Coal and Pig Iron, etc.

BUILDING AND CIVIL ENGINEERING CONTRACTORS,
INSURANCE AGENTS

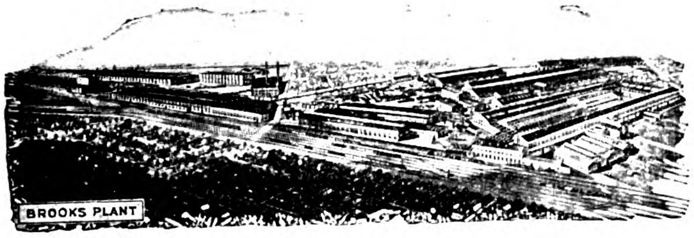
Yih Chong Wharf (Okura)

POOTUNG, SHANGHAI



LOCOMOTIVES

Our organization is equipped to furnish every facility which long experience and abundant capital can provide for producing high-class work, and for conducting the business of manufacturing locomotives on the most economical basis to both purchaser and manufacturer.



American Locomotive Sales Corporation

New York City

Telegraphic Addresses :

Locomotive : Peking, China — Bamco : Sydney, Australia

Mitsui : Tokio, Japan — Nottac : Manila, P.I.

Dilpax : Honolulu, Hawaii

MITSUI BUSSAN KAISHA

Cable Address: "MITSUI"

Capital: Yen 100,000,000
Reserve: „ 30,000,000

LIMITED

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

IMPORTERS AND EXPORTERS

SHIPOWNERS AND SHIPBUILDERS

Head Office: TOKYO, JAPAN

Branches:

HOME—Yokohama, Nagoya, Osaka, Kobe, Otaru, Muroran, Hakodate, Niigata, Moji, Wakamatsu, Kuchinotsu, Nagasaki, Karatsu, Miike, Taipeh, Keelung, Tainan, Takow, etc., etc.

ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soerabaya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc., etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc., etc.

IMPORT.

Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

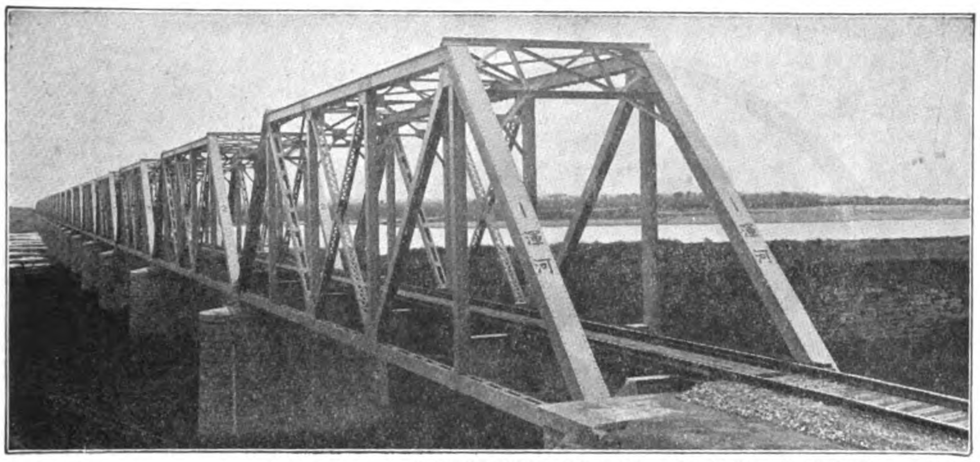
ENGINEERING DEPARTMENT

Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Export Co.
Manning Maxwell & Moore, Inc.

Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc., etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



A Bridge Over the Hun River, South Manchuria Railway, Asia.

Steel Construction Work

To try to give a list of all the things we could do for you in the way of Steel Construction would cover pages of this publication. If you have a steel construction job to be done well and on time you may safely leave it to us.

For over twenty years we have been furnishing steel structures, pipe lines, transmission towers, steel bridges, etc. We are prepared to furnish estimates on any steel construction job throughout the World.

Write for descriptive booklet No. 30.

We Design, Manufacture and Erect
Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity, 400,000 Tons

McClintic-Marshall Products Co.
Works: PITTSBURGH, U.S.A.
Foreign Contract Department, 50 Church Street NEW YORK, U.S.A.

Cable Address "Macmarsh" New York — *Codes* Bentleys, General, Western Union, Lieber

England: George A. Smith, St. Stephen's House, Westminster, S. W. 1, London
France: Produits Metallurgiques McClintic-Marshall, 8, Rue Edouard VII, Paris
South Africa: Robertson & Moss, 11-17 Trust Building, Johannesburg
China: Lam, Glines & Company, 4-B Peking Road, Shanghai
Japan: H. E. Root, 73 Yamashita-cho, Yokohama
Cuba: San Ignacio y Obrapia, Havana

McClintic-Marshall
Steel Construction

MACHINERY for Manufacturing Tin Cans—Tin Ware—Metal Packages Cutlery—Hardware—Aluminum Ware and Enamel Ware—Electrical Equipment. Also Horseshoe—Minting and Drop Forging Machinery

1857 BLISS 1922

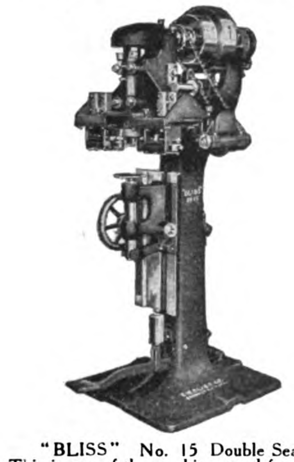
For the manufacture of tin containers as shown in the illustration above, we build complete lines of machines.

We build full automatic machines for large production and semi-automatic machines for small production.

For 65 years we have specialized in building this type of machinery. In our machines there are incorporated the most modern and the best attachments developed by experience in actual use.

To quote intelligently we must have samples or drawings of the articles to be produced and know the daily production required of each article.

"BLISS" on your machinery is more than a name; it's a guarantee.



"BLISS" No. 15 Double Seamer. This is one of the machines used for small production in the manufacture of square, oval or oblong tin cans such as shown in the illustration.
It attaches or double seams the bottom onto the can body.

E. W. BLISS CO. MAIN OFFICE AND WORKS **BROOKLYN, N. Y., U. S. A.**

American Factories: BROOKLYN, N.Y. HASTINGS, MICH. CLEVELAND, OHIO. SALEM, OHIO.

FOREIGN SALES OFFICES AND FACTORIES:
ENGLAND, Pocock St., Blackfriars Rd., S. E., London — ITALY, 345 Via Nizza, Turin — FRANCE, 54 Blvd. Victor-Hugo St. Ouen, Paris

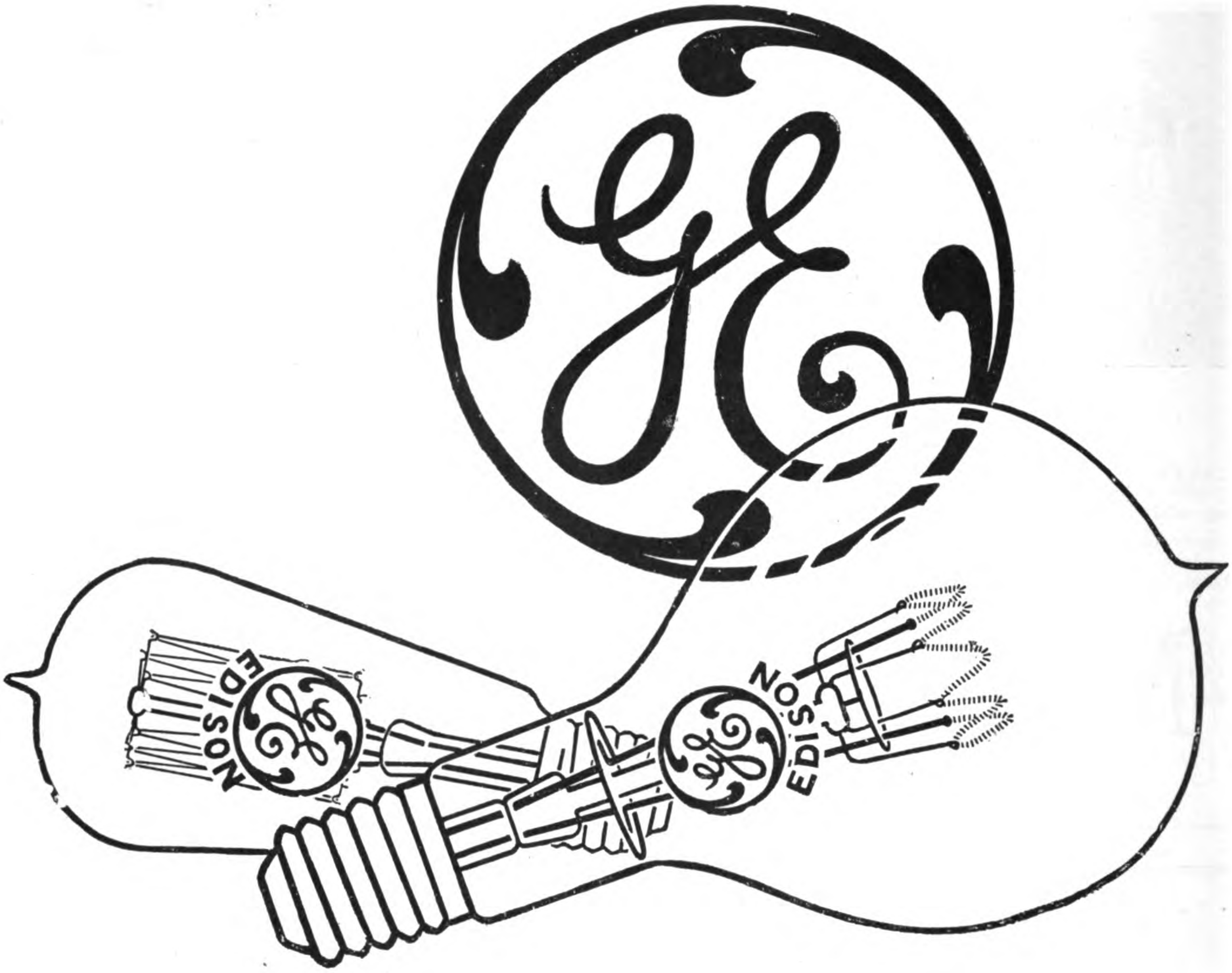
FOREIGN REPRESENTATIVES:

INDIA
Alkin and Duff Eng. Co.,
Clive Building, Calcutta

CHINA
Allied Machinery Co. of America,
Shanghai, Tientsin, Dairen, Manchuria

JAPAN
Horne Co., Ltd.
Tokyo, Osaka

No. 240



Look for the **G. E. EDISON** trade-mark

It is a guarantee of

Lighting Efficiency
Current Economy
Long Service

Your electric dealer sells them

Andersen, Meyer & Co., Ltd.

General Distributors for China

STANDARD OIL COMPANY OF NEW YORK

26 Broadway New York

The Mark of Quality

SOCONY PRODUCTS

Illuminating Oils Lubricating Oils

Gasoline and Motor Spirits

Lamps, Stoves and Heaters

Road Oils and Material for Road Building

Paraffine Wax and Candles

BRANCH OFFICES IN PRINCIPAL CITIES OF

Japan
China
Indo-China
Siam
Philippine Islands
Straits Settlements
Netherlands India
India
South Africa
The Levant

THE
HONGKONG & WHAMPOA DOCK CO.
LIMITED,

HONGKONG

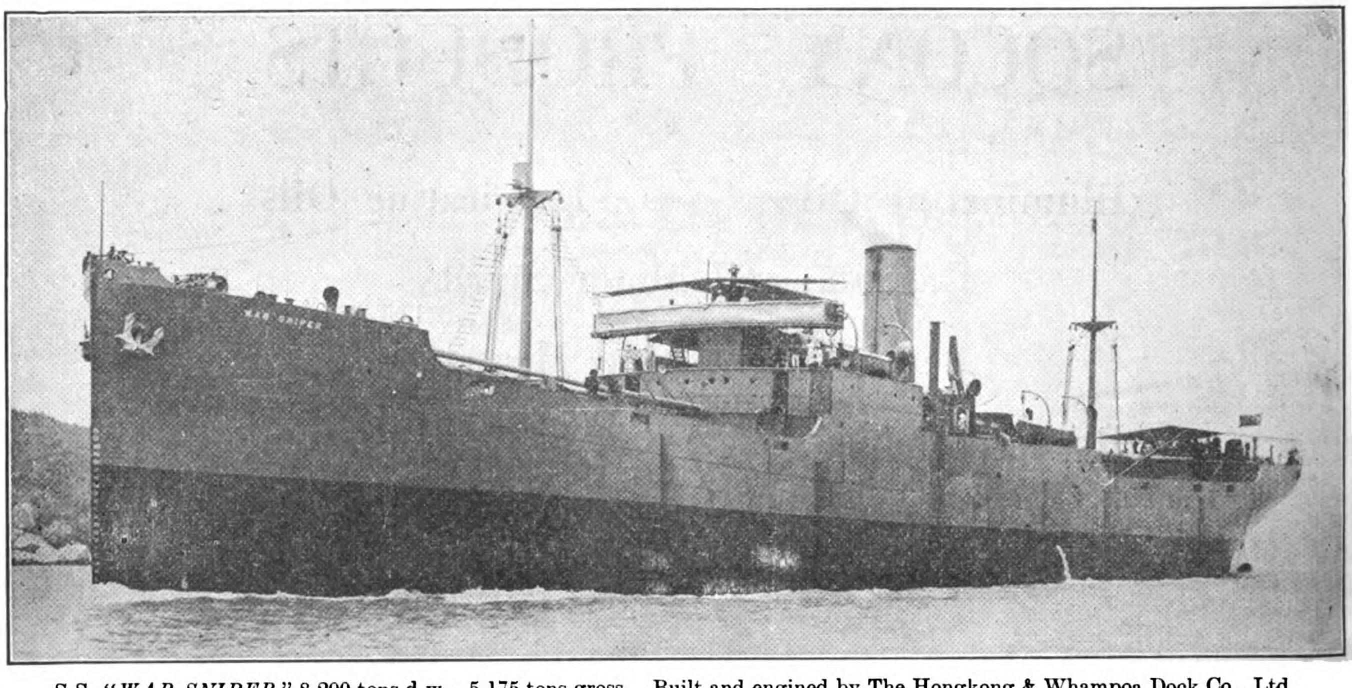
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers,
Boiler Makers, Iron and Brass Founders,
Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER,*" 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

With Steel Plate or Cast Iron Frames

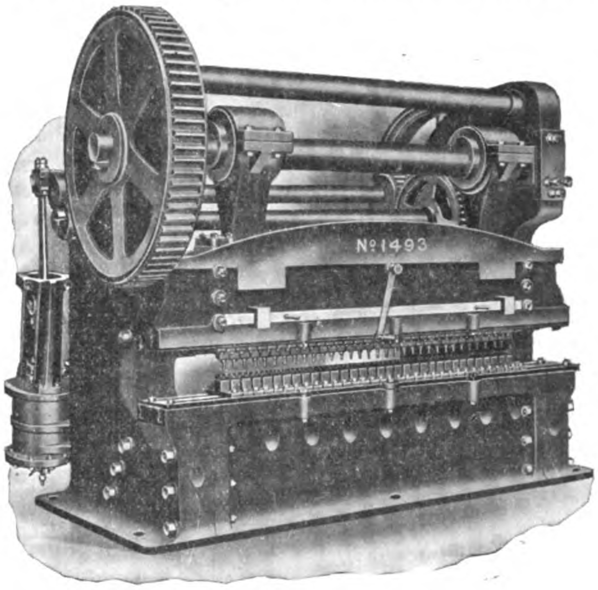
Agents for China:—

The Anglo-Chinese Engineers' Association, Ltd. in Association with Reiss & Co.

Address:—

Ice House St., Hongkong
7 Hankow Rd., Shanghai
Liddell Buildings, Yaku Road, Tientsin.

52 Dar Farng Chia Hutung, Peking.



Multiple Punching Machine

Punching and Shearing Machines.
Plate Bending Machines.
Plate Straightening Machines.
Plate Edge Planing Machines.
Plate Shearing Machines.
Steam Bending and Straightening Machines.
Bar Cropping Machines.
Multiple Punching Machines.
etc. etc.

CRAIG & DONALD LIMITED

Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LTD.

PATENT

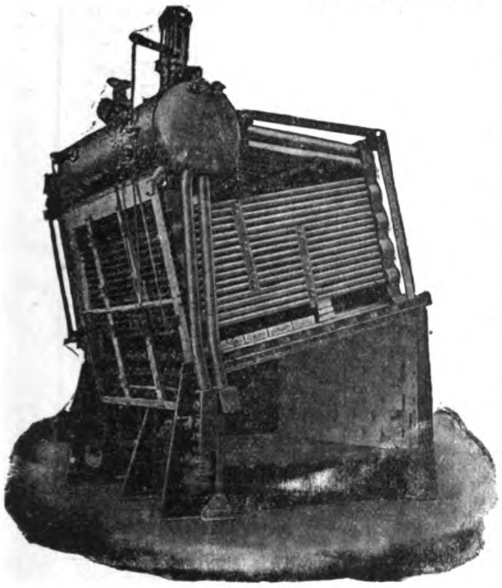
WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES, AND FOR BURNING ANY KIND OF FUEL

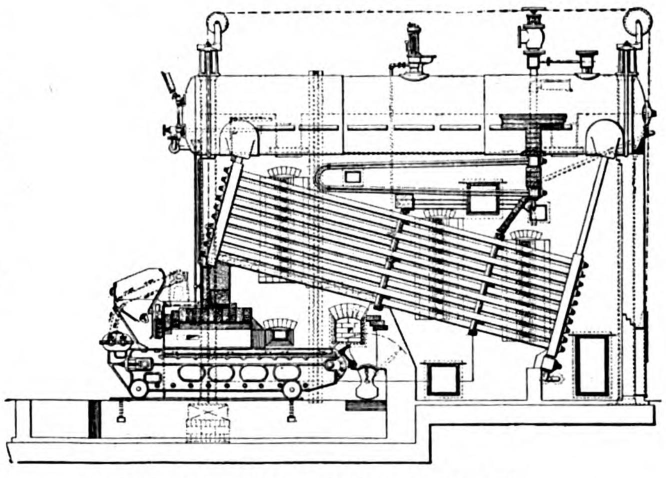
ADVANTAGES:

- Simple in Design. Easy to Clean
- Constructed of Wrought Steel. Rapid Steam Raiser
- Economical in coal. Economical in Repairs
- Very Durable. All Straight Tubes
- No Screwed Joints. No Cast Metal
- No joints exposed to the Fire
- Rapid Circulation of Water
- Steady Water Level
- Large Steam Space
- Installed in many large installations in China and Japan

13,400,000 H.P. Land-type For Stationary Purposes—**6,400,000 H.P.** Marine-type Afloat



Babcock & Wilcox Marine Boiler



BABCOCK & WILCOX LAND BOILER, fitted with Patent Superheater and Chain Grate Stoker

For Burning Chinese and Japanese Coal Smokelessly
Complete Steam Piping Plants and all Boiler House Accessories.
Also White-Forster Water-Tube Marine Steam Boilers.

MANUFACTURERS OF

Steam Superheaters	Economisers	Mechanical Stokers
Feed-Water Heaters	Water Softeners and Purifiers	Steal Chimneys
Coal Conveyors	Structural Steel Work	Electric Cranes
Suction Ash Plants		

Head Office in China: 1 THE BUND, SHANGHAI
" " Japan: 1 1-CHOME, YURAKU-CHO, KOJIMACHIKU, Tokyo

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

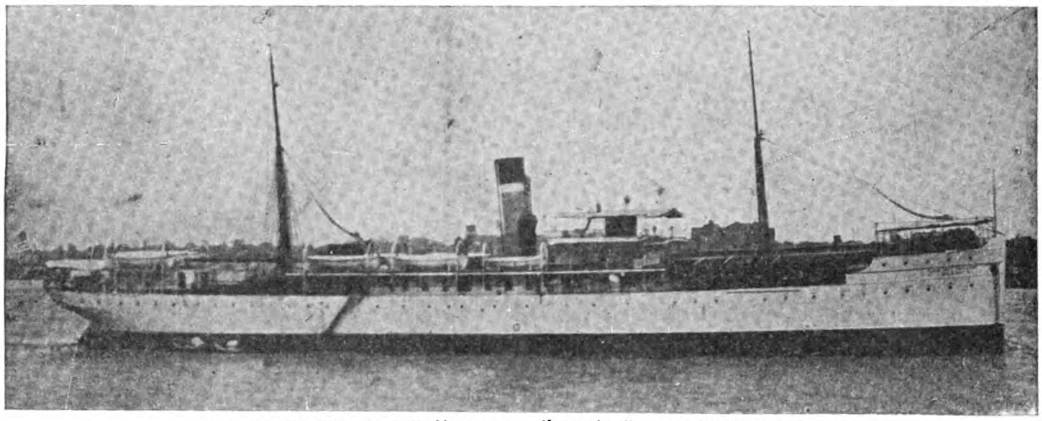
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″.

Cable Address "FARNHAM"
Codes Used, A.B.C. 4th, 5th & 6th Editions A-1, Watkin's, Scott's, Western Union, Bentley's and Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are four in number, ranging in length from 355 feet to 700 feet on the Blocks, and breadth of entrance from 53 feet to 80 feet, with a depth of water on the sill of from 16 feet to 27 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs ; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Low Pressure Hot Water and Steam Heating Installations

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR
"F.B." INTERNATIONAL CODE

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

ENQUIRIES SOLICITED

Light railway lines are laid throughout workshops and yards.

A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

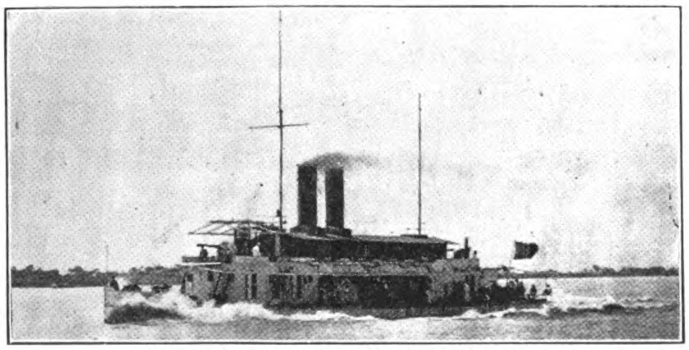
Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

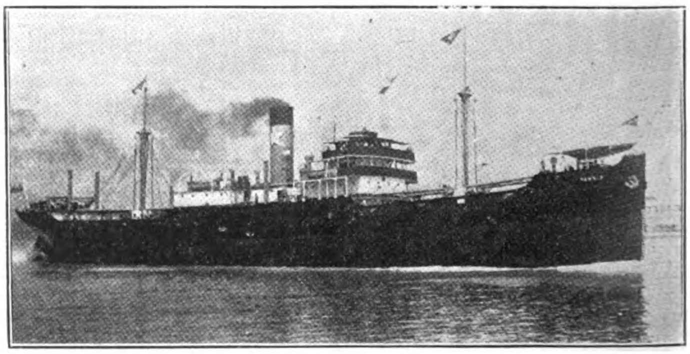
Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

PARTICULARS OF DRY DOCKS

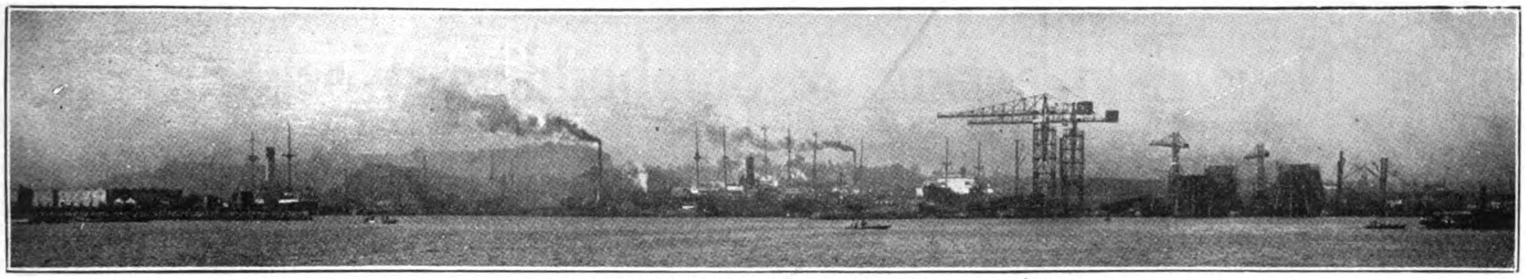
Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock ...	700 feet	80 feet	27 feet
International Dock ...	528 ,,	77 ,,	23 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,



H.I.M.S. "ERMANNO CARLOTTO"
Designed and Constructed for the Royal Italian Navy
Length 160 feet. Twin Screw Engines.
Draft 2 feet 10 inches with full equipment and 30 tons of coal on board. Mean continuous speed 14 knots per hour.



s.s. "YANNIS" ex "WAR TIARA"
Sister Ship s.s. "PANAGIS" ex "WAR DIADEM"
Sister Ship s.s. "MELLON" ex "WAR REGALIA"
Built for the British Government.



View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

Head Office: Nagasumi-cho :: *Warehouse Office:* Midori-cho

Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
"DOCK"
Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:

No. 1	625′ × 80′ × 28′
No. 2	380′ × 50′ × 26′
No. 3	480′ × 63′ × 21½′

SHIPBUILDING BERTHS:

No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4 / No. 5	680′ × 38′

WAREHOUSES:

	TSUBO.
Iron Building	8,871.57
Concrete Building	1,636.99
Brick Building	2,011.72
Others	5,807.74

Directors: TOSHINOBU SUDA, Esq. *(Chairman),* MANKICHI MIYANAGA, Esq. *(Managing Business Dept.),*
TAMATARO TOJO, Esq. *(Managing Shop Dept.)*

Agencies: NIPPON YUSEN KAISHA, London Branch. NIPPON YUSEN KAISHA, New York Branch.

All situated in Yokohama Harbour, the First Port at which Trans-Pacific Steamships arrive, and the Last Port from which they depart.

Complete Facilities for every Work and Fully Equipped up to date for

All Repairing Work. All Engine Work. All New Ship Work. All Boiler Work.

LIFTS

FOR ALL PURPOSES
FITTED WITH WORLD-FAMED VEE WHEEL DRIVE

MANUFACTURED BY

SMITH MAJOR & STEVENS LTD.

LONDON AND ABBEY WORKS, NORTHAMPTON
ENGLAND

EASTERN AGENTS:

CALCUTTA
MESSRS. JESSOP & CO., LTD.,
93 CLIVE STREET

SHANGHAI
MESSRS. SCOTT, HARDING & CO.,
6 PEKING ROAD

SINGAPORE
MESSRS. UNITED ENGINEERS, LTD.
5 BATTERY ROAD

EXCLUSIVELY USED BY BRITISH ADMIRALTY ON ALL LATEST BATTLESHIPS.

The New Engineering & Shipbuilding Works, Ltd.

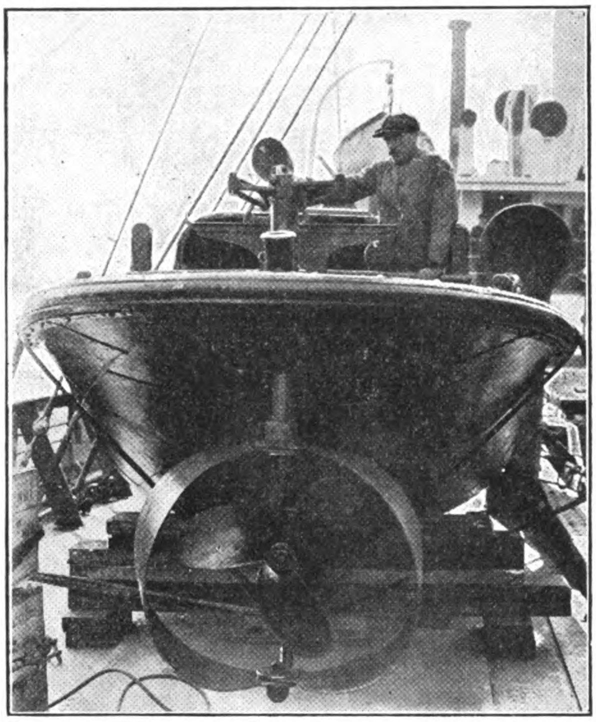
PROPRIETORS OF THE YANGTSZEPOO DOCK

Head Offices: 45 YANGTSZEPOO ROAD, Shanghai, China.

Call Flag: INTER. "A" CABLE ADDRESS: "SPEEDY"

SHIPBUILDERS AND REPAIRERS, MILLWRIGHTS, ENGINEERS, BOILERMAKERS, ELECTRICIANS, BLACKSMITHS AND FOUNDERS, SALVAGE EXPERTS, ELECTRIC AND OXY-ACETYLENE WELDERS. MANUFACTURERS OF THE "SPEEDY" MOTOR. MAKERS OF STURROCK'S PATENT FURNACE BRIDGES. MAKERS OF STEEL WINDOW CASEMENTS AND STRUCTURAL STEEL FOR BUILDINGS AND BRIDGES. MAKERS OF CARGO LIFTS.

SOLE REPRESENTATIVES FOR KITCHEN'S REVERSING RUDDERS



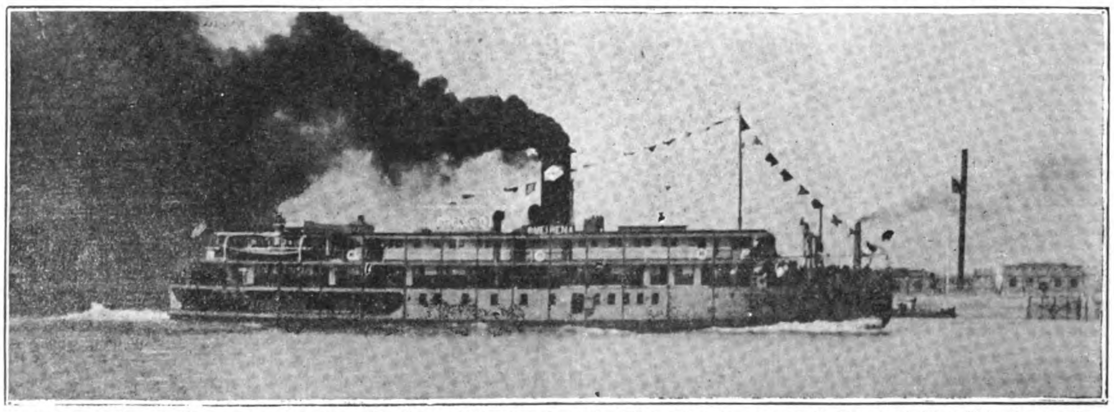
The only rudder which gives full speed control to the helmsman and allows the course of the vessel to be reversed while engines continue to run ahead.

The only rudder which entirely does away with reversing gear and clutch on motor engines and thereby improves engine efficiency and economy and reduces wear and tear considerably.

So simple that any Native can easily handle it. Particularly suitable for tugs and motor boats. Reduces all danger of manœuvring in congested waterways. Avoids any sudden pull on tow rope which might cause breakage.

Vessels Docked or Placed on Slip at Short Notice

ESTIMATES, DESIGNS AND SPECIFICATIONS, PREPARED FREE OF COST FOR THE CONSTRUCTION OF ALL CLASSES OF ENGINES AND BOILERS, CONDENSING PLANTS, STEAMERS, TOW BOATS, LAUNCHES, PONTOONS AND LIGHTERS, WATER TANKS, WATER TOWERS, ELECTRIC POWER AND LIGHT INSTALLATIONS.



200-feet Upper Yangtsze Steamer Built and Engined at the New Engineering & Shipbuilding Works, Ltd.

Repairs and Overhauls Effected Promptly, Efficiently and Expeditiously Under Foreign Supervision at Moderate Charges.

SPECIAL STAFF FOR ATTENDING TO REPAIRS AT MILLS AND FILATURES.

Cable Address :
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO., LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

DAIREN, N.-C.,
Dockyard & Engineering Works

HYOGO, KOBE
Steel Foundry, Bar Mill and Railway Shops

FUKIAI, KOBE
Plate Mill

BUILDERS OF

BATTLESHIPS, CRUISERS, TORPEDO-BOATS, DESTROYERS, SUBMARINES

ALSO, BUILDERS OF

FIRST-CLASS HIGH-SPEED OCEAN STEAMERS OF THE LARGEST SIZE AND POWER

CREOSOTED TIES

OF

PHILIPPINE TIMBER

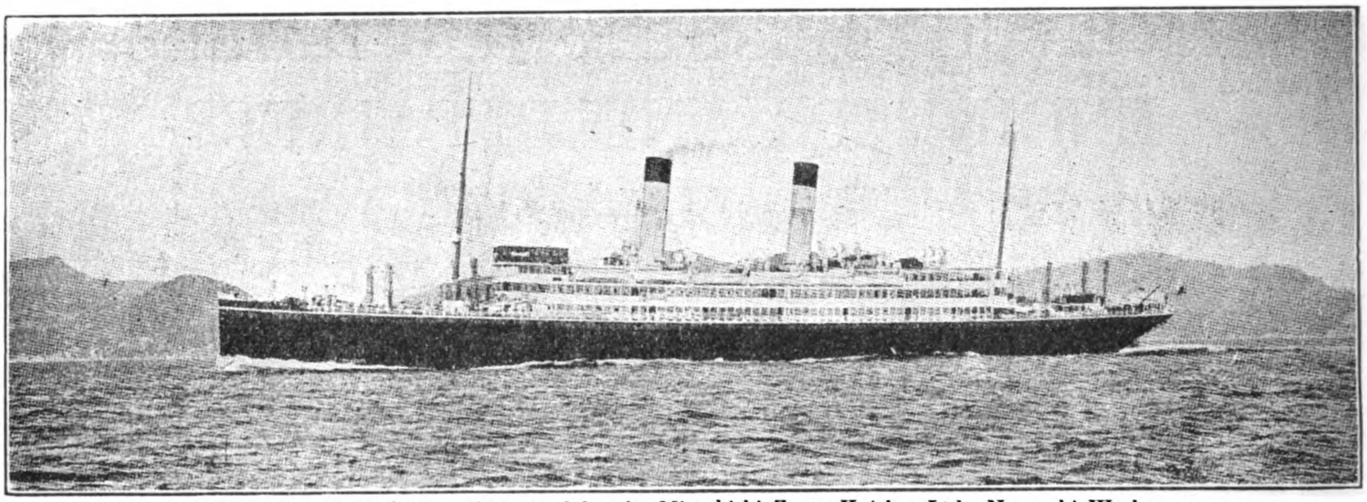
FOR

RAILROADS

ATLANTIC, GULF & PACIFIC CO. OF MANILA

77 Muelle de la Industria — Manila, P.I.

Cable Address: "DREDGING"



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

DOCK No. 1			DOCK No. 2			DOCK No. 3		
Extreme Length - - - - -	523	Ft.	Extreme Length - - - - - -	371	Ft.	Extreme Length - - - - - -	728.9	Ft.
Length on Blocks - - - - -	513	,,	Length on Blocks - - - - - -	350	,,	Length on Blocks - - - - -	714	,,
Width of Entrance on Top - -	89	,,	Width of Entrance on Top - - -	66	,,	Width of Entrance on Top - -	99½	,,
,, ,, ,, ,, Bottom-	77	,,	,, ,, ,, ,, Bottom -	53	,,	,, ,, ,, ,, Bottom -	88½	,,
Water on Blocks at Spring Tide	26½	,,	Water on Blocks at Spring Tide -	24	,,	Water on Blocks at Spring Tide -	34½	,,

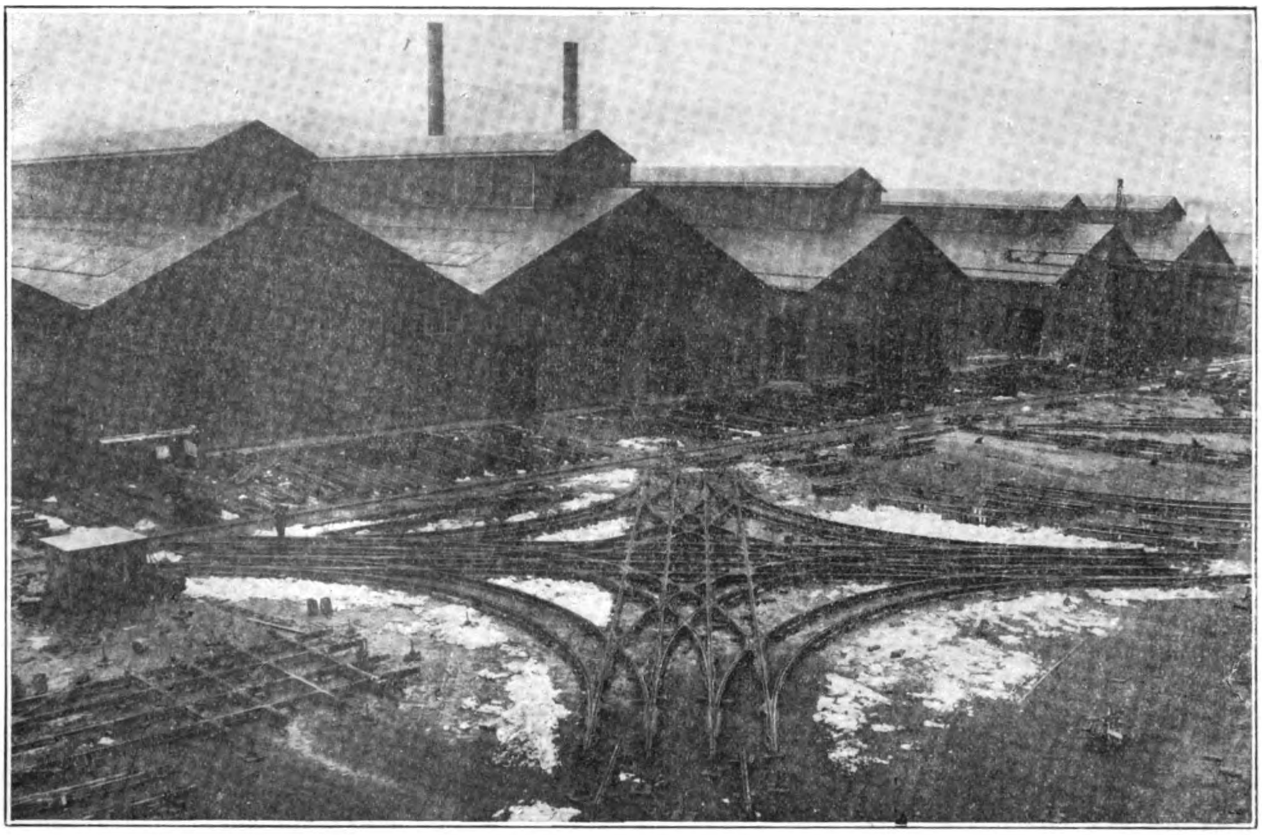
THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
Also Electrical Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND

LORAIN

Special Track Work



The Standard Tramway Construction Throughout the World

UNITED STATES STEEL PRODUCTS CO.

UNION BUILDING
THE BUND AND CANTON ROAD
SHANGHAI
CHINA

15 NAKADORI MARUNOUCHI
TOKYO, JAPAN

22 WU LIANG TA JEN HUTUNG
PEKING, CHINA

MITSUBISHI IRON AND STEEL CO., TD.

(MITSUBISHI SEITETSU KAISHA, LTD.)

HEAD OFFICE: MARUNOUCHI, TOKYO

CAPITAL: (PAID UP) YEN 30,000,000

MILL (LLOYD'S APPROVED) KENJIHO, CHOSEN (KOREA)

PRODUCTS PIG IRON—Basic & Foundry 100,000 tons.

STEEL—High Tensile & Mild Steel 50,000 tons.

BY-PRODUCTS—Sulphate of Ammonia; Pitch; Naphthalene; Tar Oil (light, middle, heavy); Slag-Cement, Slag Wool.

Sales Agents: **The Mitsubishi Trading Company, Limited**

BRANCHES AND AGENCIES: Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

MITSUBISHI MARINE & FIRE INSURANCE Co., Ltd.

MITSUBISHI KAIJO KASAI HOKEN K. KAISHA

Head Office:

MARUNOUCHI, TOKYO

SUBSCRIBED CAPITAL - - Yen 5,000.000

PAID-UP CAPITAL - - - „ 1,250.000

Branches and Agencies:

LONDON, NEW YORK, OSAKA, KOBE, SHANGHAI, AND OTHER IMPORTANT CITIES AND PORTS IN THE WORLD

MITSUBISHI WAREHOUSE CO., LD.

(MITSUBISHI SOKO KAISHA, LTD.)

LANDING, SHIPPING AND FORWARDING AGENTS, STEVEDORES, CUSTOMS BROKERS & WAREHOUSEMEN

Head Office: MARUNOUCHI, TOKYO

Branches: TOKYO, YOKOHAMA, KOBE, OSAKA AND MOJI

General Managers of the

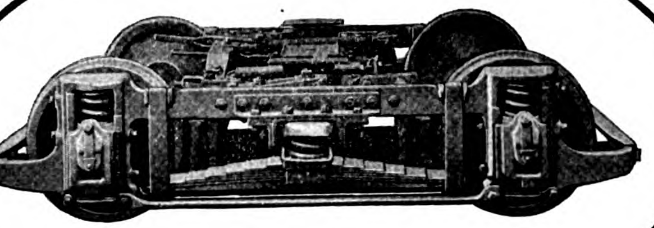
KYODO UNYU KAISHA

YOKOHAMA

3 KAIGAN-DORI, ITCHOME

YOKOHAMA

WITH TWO BRANCHES IN TOKYO



No. 77-E Truck
24 or 26-in. Wheels

For
LOW-LEVEL CARS

Far East Representative:
Andersen, Meyer & Co., Ltd., Shanghai
Pacific Commercial Co., Manila

BRILL

Main Office and Works
PHILADELPHIA, U.S.A.

THE J. G. BRILL COMPANY

Builders and Exporters

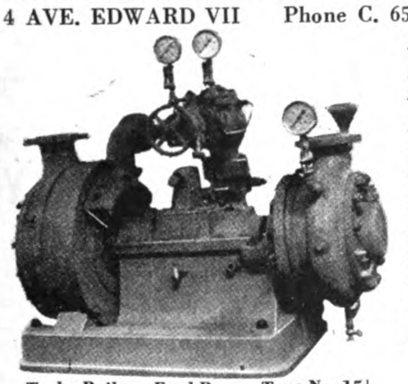
ELECTRIC TRAMCARS AND TRUCKS

SULZER BROTHERS

SHANGHAI ENGINEERING OFFICE
No. 4 AVE. EDWARD VII Phone C. 6512

目錄及關於工業上之問答等請直接本公司惟須指明經何進口行以便公司與之接洽一切也

蘇爾壽
工業事務所
上海愛多亞路四號



Turbo Boiler—Feed Pumps Type No. 15½

SULZER Steam Turbine-driven Centrifugal Boiler Feed Pumps

Smallest space required, **absolute reliability,** smooth and silent working without shock. No safety valve necessary. Very little attendance required. **No feed water heater required** as turbine exhausts directly into feed water tank; its **exhaust steam** being **absolutely clean** and containing no oil, the **whole heat** being utilized. The efficiency of the set up to 95 per cent. and more. **Automatic Hydraulic Turbine Governor,** keeping pressure difference between pump and boiler constant.

WINTERTHUR. SWITZERLAND.

Through America

via

The Milwaukee Railway

(*The Puget Sound Electric Route*)

A short, quick, and most comfortable route across the American Continent over the

World's Longest Electrified Railroad

For 649 miles over four mountain ranges mighty electric locomotives, using "White Coal" for power haul the splendidly equipped all-steel transcontinental trains

"The Olympian"* and *"The Columbian"

from Seattle and Tacoma daily for Spokane, Butte, Minneapolis, St. Paul, Milwaukee and Chicago.

"The Pacific Limited"

from San Francisco to Chicago via Southern Pacific, Union Pacific and Milwaukee Railways.

At Chicago connections are made with fast express trains for the Atlantic Seaboard and all points east.

Rail orders and full information respecting train schedules, connections, fares, etc., on application to your steamship agent or at any office of Thos. Cook & Son in the Orient.

For sleeping car reservations, write, cable or wireless any of the following representatives of the

Chicago, Milwaukee & St. Paul Railway

Cable Address: "Milwaukee"

Seattle—J. F. Bahl, City Passenger Agent, 2nd and Madison
San Francisco—C. H. Miles, General Agent Passenger Dept., 995 Monadnock Bldg.
Vancouver—Geo. W. Hibbard, General Agent, 626 Hastings St., West
Victoria—F. O. Finn, General Agent, 902 Government St.
A. P. Chapman, Jr., Ass't Gen'l Passenger Agt., 663 Stuart Bldg., Seattle
Geo. B. Haynes, General Passenger Agent, Chicago

TOSHIN SOKO

KABUSHIKI KAISHA

WAREHOUSING, FORWARDING AND EXPRESS CO.

WAREHOUSEMEN LANDING AND SHIPPING

STEVEDORES CUSTOM BROKERS

WAREHOUSING AREA - - - - - - - - - 76,000 tsubo (308,000 Sq. yds.)

VALUE OF GOODS IN WAREHOUSE (latest date) - - - - Yen 95,000,000

CAPITAL (PAID UP) - Yen 5,000,000; RESERVE FUND - Yen 4,768,000

President: BARON TOSHITARO MITSUI

Managing Directors: H. OKUMURA and R. KADONO

Directors: K. HAYASHI and K. FUKUI

Auditors: E. KOSHI and T. MAJIMA

HEAD OFFICE: No. 5 HONKAWAYA-CHO, NIHONBASHI-KU, TOKYO

BRANCHES and SUB-BRANCHES:

TOKYO—Hakozaki-cho, Fukagawa-ku

OSAKA—Nakanoshima, Nishi, Utsubo, Aji-kawa, Nishinari, Sakurashima Chikuko

YOKOHAMA—Shinko-cho

NAGOYA

KOBE—Kano-cho

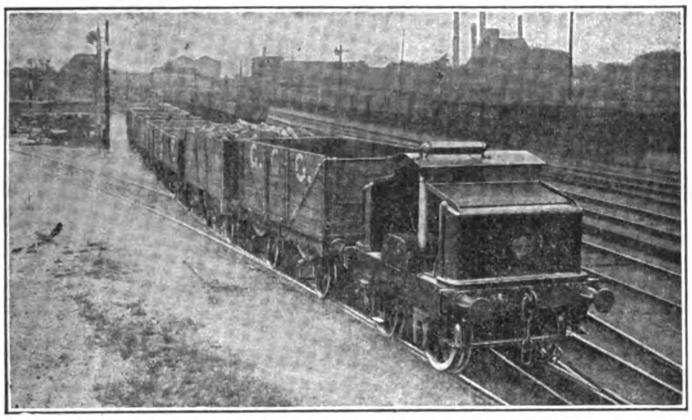
MOJI—Hama-cho

SHIMONOSEKI—Kannonzaki-cho

MOTOR RAIL & TRAM CAR CO., LTD.

LIGHT RAILWAY ENGINEERS

Manufacturers of Internal Combustion Engines; Locomotives, Rail-Inspection and Tramcars



40 H.P. Loco Working on Main Line Siding

These vehicles are thoroughly reliable, economical, inexpensive to maintain, easily handled and entail no stand-by losses

All kinds of Light Railway Material supplied

ENQUIRIES SOLICITED

WORKS & OFFICES:
Telegrams & Cables: Motral-Bedford
Codes: A.C.B. Engineering 5th Ed & Bentley

SIMPLEX WORKS:
Bedford, England

CIGARETTE MACHINERY

800 Cigarettes per Minute!

PLAIN OR TIPPED ON

Our New "Triumph-Model U.G." Cigarette Machine

The phenomenal speed of this machine, its supreme simplicity and its low cost of upkeep, are due to the revolutionary improvements in its design and construction—the outcome of 40 years of experience in the manufacture of cigarette machinery.

This machine is an indispensable part of the equipment of any modern up-to-date factory. Old modern machines are rapidly being replaced. The measure of your success depends on your cost of production.

Write for full particulars to-day on our—

CIGARETTE MACHINES
TOBACCO STEMMING MACHINES
AUTOMATIC KNIFE GRINDERS
CIGARETTE PACKING MACHINES

UNITED CIGARETTE MACHINE CO., Inc.,
Lynchburg, Va., U.S.A.

Agents for China: AMERICAN TRADING CO.
Robert Dollar Building, SHANGHAI

SHANGHAI TO SEATTLE 16 DAYS

A New Fast American
TRANS-PACIFIC SERVICE
between MANILA-HONGKONG
SHANGHAI
KOBE-YOKOHAMA
and PUGET SOUND
VICTORIA, B.C.—SEATTLE, WASH.
VIA THE SHORT ROUTE

UNITED STATES SHIPPING BOARD 535's

		Leaving Shanghai		Arr. Seattle	
President Grant	(X Pine Tree State)	Oct.	22	Nov.	7
„ Jefferson	(X Wenatchee	Nov.	5	Nov.	21
„ Madison	(X Bay State)	Nov.	19	Dec.	5
„ McKinley	(X Keystone State)	Dec.	3	Dec.	19
„ Jackson	(X Silver State)	Dec.	17	Jan.	2

AGENTS

Manila: No. 24 Calle David, P.O. Box 1636
Hongkong: No. 2 Ice House Street.
Shanghai: No. 29-B Nanking Road, Amer. P.O. Box 503
Kobe: No. 7-A Kaigan-Dori, P.O.Box 308
Yokohama: No. 75-A Main Street, P.O. Box 326
Singapore: No. 2 Prince Street.

HEADQUARTERS FOR THE FAR EAST
No. 29-B Nanking Road, Shanghai.
Major GEO. A. HEYBURN, Acting Manager.
GEO. J. McCARTHY, Assistant General Passenger Agent.

THE ADMIRAL LINE P.S.S.CO.

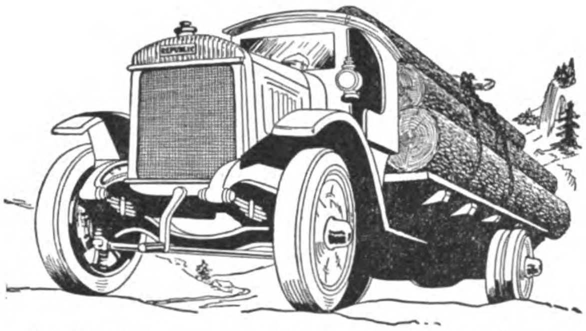
The ADMIRAL LINE

ANYWHERE ON THE PACIFIC

PACIFIC STEAMSHIP COMPANY

UNEQUALLED SERVICE
TO THE USER

REPUBLIC



Models 15 cwt.—1 ton—1½ tons—2-2½ tons—3½ tons

Where the exercise of high power and heavy haulage is essential to the successful operation on Commercial vehicles, Republic Trucks demonstrate their inbuilt excellence.

Not only do they offer the greatest value in transportation judged by initial cost but Republic Trucks, by their immunity from trouble and constant service, offer the lowest day-to-day cost.

Built by a great organization, specializing on commercial vehicles alone, Republic Trucks are constructed on lines that have been proven through years of successful design and continuing refinement. There is a Republic for every business need.

Central Garage Co., Ltd.,
9 Hongkong Road,
Shanghai

REPUBLIC TRUCK SALES CORPORATION,
Alma, Michigan, U.S.A.
Cable Address : REPUBLIC

Humber

STANDARD MODELS.

11.4 h.p. 2-Seater (with double Dickey Seat)
11.4 h.p. Coupé (with double Dickey Seat)
11.4 h.p. 4-Seater 15.9 h.p. 5-Seater
11.4 h.p. Saloon 15.9 h.p. Saloon

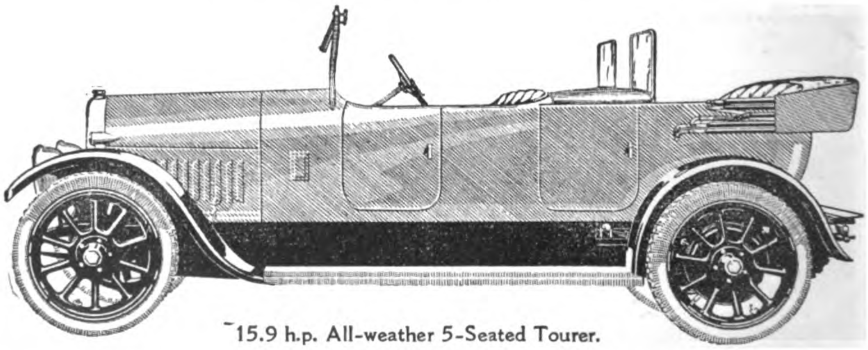
HUMBER LIMITED.
Works:
COVENTRY, ENGLAND.
Export Dept.:
Humber House, 94 New Bond St.,
LONDON.

The High Average Car

RIGHTLY acclaimed as "a model of luxurious comfort and superb refinement," the Humber 15.9 h.p. 5-seater Touring Car is indeed a triumph of engineering skill and accomplishment.

It is described by independent Motor experts as exactly what a 5-seated owner-driver's car should be in the matter of general arrangement and equipment of both chassis and body.

All Humber Cars are fitted with detachable steel Artillery Wheels suitable for all climates. All open models are fitted with the Humber All-weather Hood (with side curtains opening with the doors) which provides for complete protection even in tropical rains.



15.9 h.p. All-weather 5-Seated Tourer.

KOKUSAI KISEN KAISHA

Nominal Capital	- -	Yen 100,000,000.00
Paid-up Capital	- -	„ 87,500,000.00
Aggregate Tonnage	- -	500,000 Tons

FLEET OF STEAMSHIPS

Name	Tons D.W.
Rozan-Maru	8,700
Vancouver-Maru	9,100
Boston-Maru	8,800
Tofuku-Maru	9,100
Chifuku-Maru	9,100
Ryufuku-Maru	9,100
Hankow-Maru	6,400
Yoni-Maru	11,000
Taibu-Maru	8,900
San Francisco-Maru	9,100
Naple-Maru	9,100
Glasgow-Maru	9,100
Yayoi-Maru	8,700
Yaye-Maru	11,000
Malta-Maru	8,700
Buyo-Maru	8,800
Brazil-Maru	9,100
Kofuku-Maru	9,100
Yezari-Maru	6,900
Yugao-Maru	5,000
Yubaye-Maru	5,000
Sydney-Maru	6,400
Shanghai-Maru	6,400
Singapore-Maru	9,100
Jyufuku-Maru	9,100
Hiyeizan-Maru	6,700

Name	Tons D.W.
Seifuku-Maru	9,100
Suez-Maru	6,600
Daio-Maru	9,000
Kashu-Maru	8,800
No. 2 Kifunesan-Maru	5,000
Yousan-Maru	5,000
Taisan-Maru	5,000
Yuri-Maru	11,000
Texas-Maru	11,000
Tamatsu-Maru	6,600
Eifuku-Maru	9,100
Kifuku-Maru	9,100
Toyofuku-Maru	9,000
Raifuku-Maru	9,100
Keifuku-Maru	9,100
Washington-Maru	9,100
Tokufuku-Maru	9,100
Portland-Maru	9,100
England-Maru	9,100
Chili-Maru	9,100
Argentine-Maru	9,100
Port Said-Maru	9,100
New York-Maru	9,100
Karorin-Maru	6,400
Tasmania-Maru	6,400

Head Office: No. 8 Kaigan-dori, Kobe

BRANCH OFFICE:

Tokyo Kaijo Building, Maruno-uchi, Tokyo, Japan

Amoy
Antung
Canton
Changsha
Chefoo
Chinkiang
Dairen (Dalny)
Foochow
Hankow
Harbin
Hongkong

BUTTERFIELD & SWIRE

(JOHN SWIRE & SONS, LTD.),

FRENCH BUND, SHANGHAI

Telephone No. Central 4881

AGENTS FOR

Ichang
Kiukiang
Kobe
Nanking
Newchwang
Ningpo
Shanghai
Swatow
Tientsin
Tsingtau
Wuhu
Yokohama

The Blue Funnel Line

(Ocean S.S. Co., Ltd. & China Mutual S. N. Co., Ltd.)

Fast Services

Japan, China, Hongkong, Philippines. Straits and Java to Europe via Suez Canal and to New York via Suez and Panama Canals also

Trans-Pacific between Oriental ports and West Coast of N. America.

CHINA NAVIGATION CO., LTD.

Passenger and Freight Steamship Services

SHANGHAI TO, AND FROM,

Weihaiwei, Chefoo and Tientsin (for Peking); Newchwang: Antung.

Hankow, Ichang (with connection to Chungking), Changsha, and Intermediate Yangtsze Ports.

Hongkong and Canton; Amoy and Swatow; Ningpo; and General Coasting Services.

HONGKONG TO, AND FROM.

Manila, Cebu, and Iloilo

Weihaiwei, Chefoo and Tientsin (for Peking)

Canton; Hoihow, Pakhoi and Haiphong; Bangkok and Singapore.

Shanghai and Yangtze Ports (as above)

Sydney, Melbourne and Australian Ports (Australian-Orie tal Line)

Taikoo Sugar Refining Co., Ltd.

F I N E S T C A N E S U G A R S

Taikoo Dockyard & Engineering Company of Hongkong Ltd.

Ship Builders, Ship Repairers, Engine Builders, Boiler Makers, etc.

Fire and Marine Insurance

Fire

London and Lancashire Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

Guardian Assurance Co., Ltd.

Orient Insurance Company.

British Traders Insurance Co., Ltd.

Marine

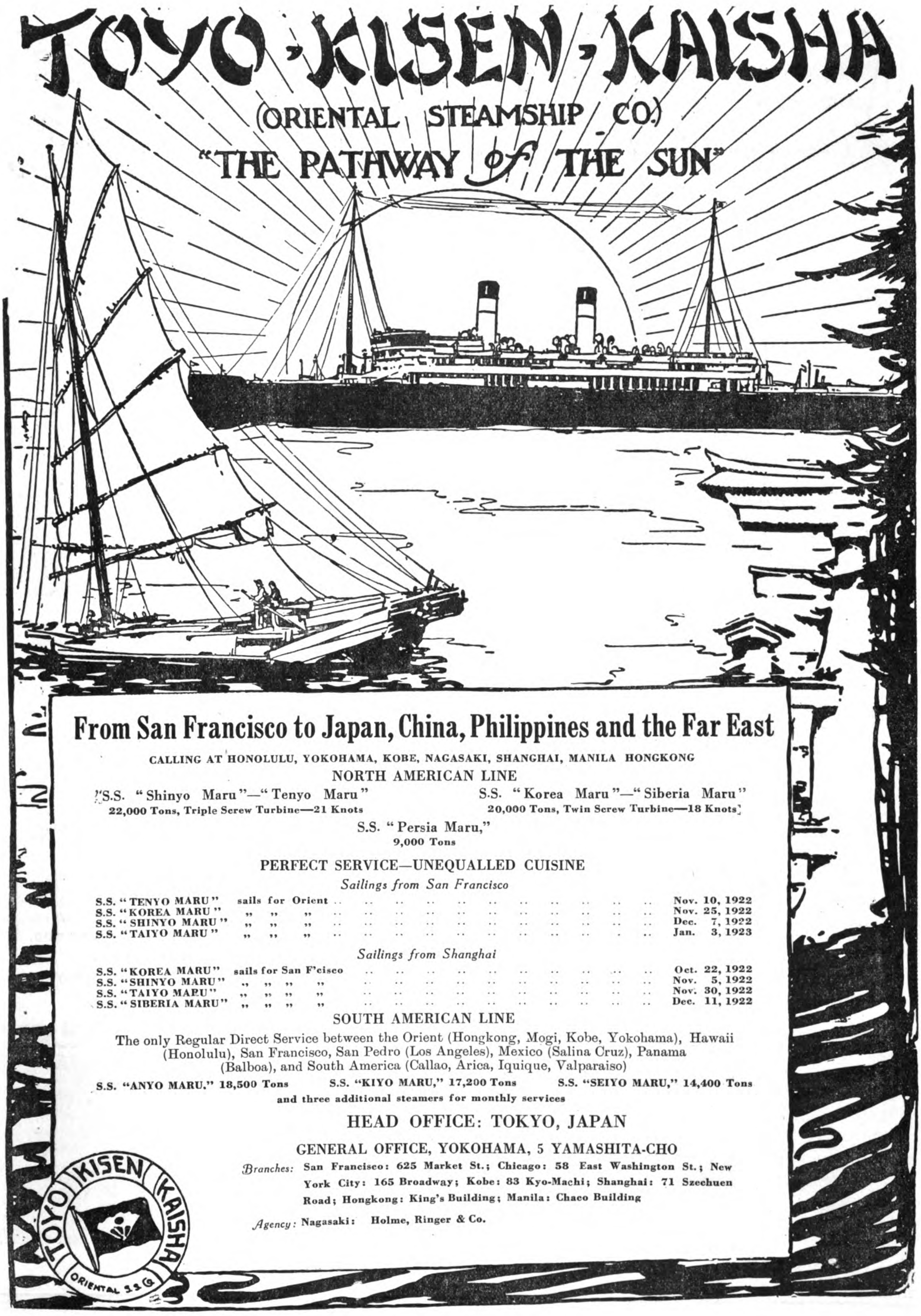
British and Foreign Marine Insurance Co., Ltd.

Standard Marine Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

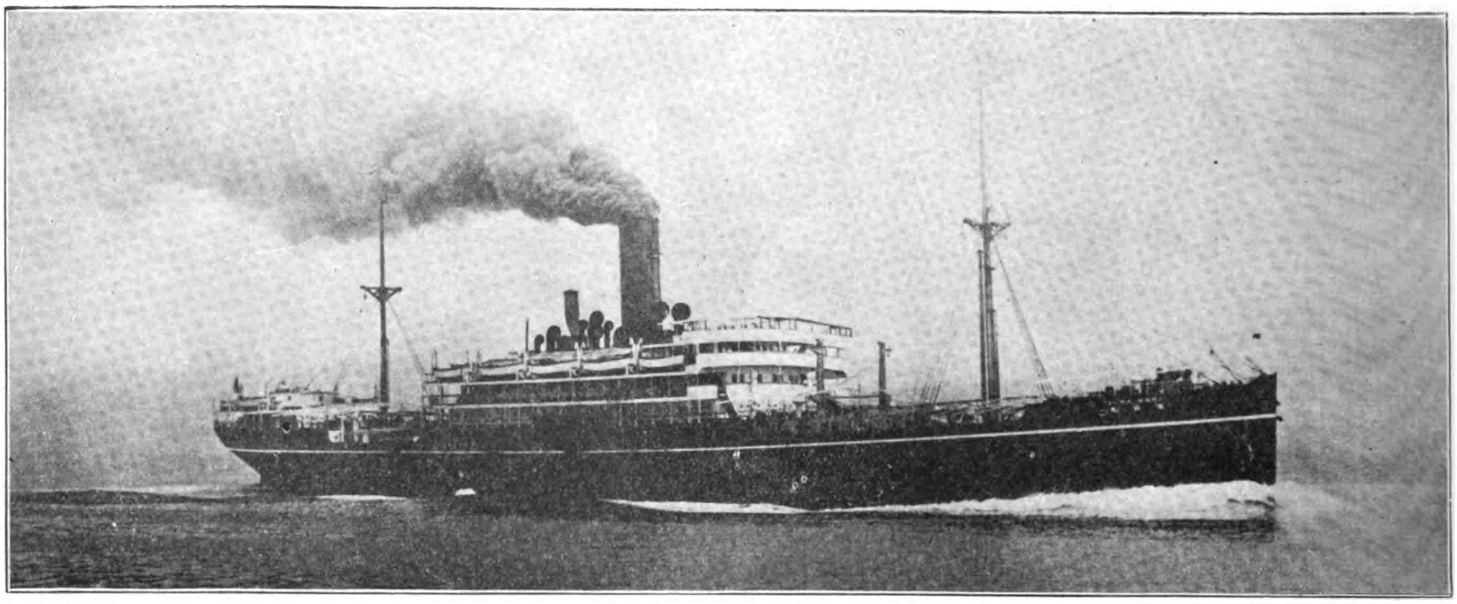
Sea Insurance Co., Ltd.

Guardian Assurance Co., Ltd.


TOYO-KISEN-KAISHA
(ORIENTAL STEAMSHIP CO.)
"THE PATHWAY of THE SUN"
From San Francisco to Japan, China, Philippines and the Far East
CALLING AT HONOLULU, YOKOHAMA, KOBE, NAGASAKI, SHANGHAI, MANILA HONGKONG
NORTH AMERICAN LINE
S.S. "Shinyo Maru"—"Tenyo Maru"
22,000 Tons, Triple Screw Turbine—21 Knots
S.S. "Korea Maru"—"Siberia Maru"
20,000 Tons, Twin Screw Turbine—18 Knots
S.S. "Persia Maru,"
9,000 Tons
PERFECT SERVICE—UNEQUALLED CUISINE
Sailings from San Francisco
S.S. "TENYO MARU" sails for Orient .. Nov. 10, 1922
S.S. "KOREA MARU" " " " .. Nov. 25, 1922
S.S. "SHINYO MARU" " " " .. Dec. 7, 1922
S.S. "TAIYO MARU" " " " .. Jan. 3, 1923
Sailings from Shanghai
S.S. "KOREA MARU" sails for San F'cisco .. Oct. 22, 1922
S.S. "SHINYO MARU" " " " " .. Nov. 5, 1922
S.S. "TAIYO MARU" " " " " .. Nov. 30, 1922
S.S. "SIBERIA MARU" " " " " .. Dec. 11, 1922
SOUTH AMERICAN LINE
The only Regular Direct Service between the Orient (Hongkong, Mogi, Kobe, Yokohama), Hawaii (Honolulu), San Francisco, San Pedro (Los Angeles), Mexico (Salina Cruz), Panama (Balboa), and South America (Callao, Arica, Iquique, Valparaiso)
S.S. "ANYO MARU," 18,500 Tons S.S. "KIYO MARU," 17,200 Tons S.S. "SEIYO MARU," 14,400 Tons
and three additional steamers for monthly services
HEAD OFFICE: TOKYO, JAPAN
GENERAL OFFICE, YOKOHAMA, 5 YAMASHITA-CHO
Branches: San Francisco: 625 Market St.; Chicago: 58 East Washington St.; New York City: 165 Broadway; Kobe: 83 Kyo-Machi; Shanghai: 71 Szechuen Road; Hongkong: King's Building; Manila: Chaco Building
Agency: Nagasaki: Holme, Ringer & Co.
TOYO KISEN KAISHA
ORIENTAL S.S. Co.

NIPPON YUSEN KAISHA

HEAD OFFICE, TOKYO, JAPAN



"SUWA MARU"

OVER THE

THE PALATIAL STEAMERS OF THE N.Y.K.

WILL CARRY YOU IN COMFORT, CLEANLINESS AND WITH COURTESY

PRINCIPAL SERVICES

EUROPEAN LINE (Fortnightly)

WEST COAST LINE (Monthly).
GLASGOW, BIRKENHEAD, AND SWANSEA (occasionally).
SINGAPORE, HONGKONG, SHANGHAI AND JAPAN.

NORTH CONTINENTAL LINE (Monthly).
HAMBURG, GRANGEMOUTH, ROTTERDAM AND ANTWERP.
STRAITS, JAVA, CHINA AND JAPAN.

NORTH AMERICAN LINE (Every 3 Weeks).
HONGKONG, MANILA, SHANGHAI, KOBE AND YOKOHAMA.
VICTORIA, B.C., AND SEATTLE.

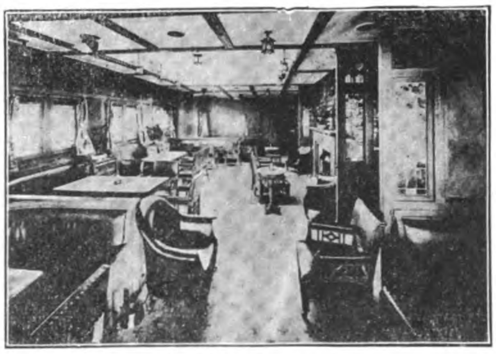
SOUTH AMERICAN LINE (Every 2 Months)
KOBE, SINGAPORE, DURBAN AND CAPETOWN.
SANTOS, RIO DE JANEIRO AND BUENOS AIRES.

AUSTRALIAN LINE (Monthly).
YOKOHAMA, KOBE, HONGKONG, MANILA, ZAMBOANGA, THURSDAY ISLAND, TOWNSVILLE, BRISBANE, SYDNEY AND MELBOURNE.

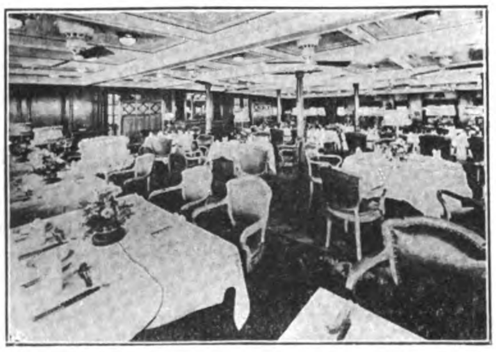
BOMBAY LINE (Fortnightly).
KOBE, SHANGHAI, HONGKONG, SINGAPORE, MALACCA, COLOMBO, TUTICORIN AND BOMBAY.

CALCUTTA LINE
(FORTNIGHTLY) YOKOHAMA, KOBE, HONGKONG, SINGAPORE, PENANG, RANGOON AND CALCUTTA.
(MONTHLY) CALCUTTA, MADRAS, COLOMBO, SUEZ, PORT SAID, ALGIERS AND NEW YORK.

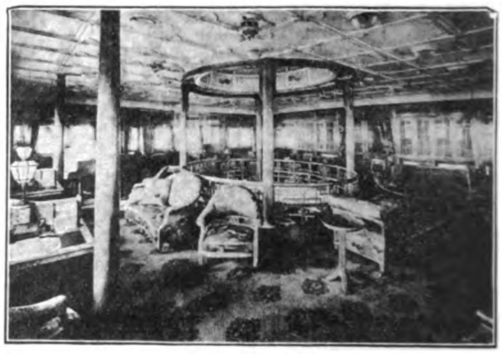
NEW YORK-FAR EAST LINE (Fortnightly)
KOBE, YOKOHAMA, SAN FRANCISCO, PANAMA, COLON, HAVANA AND NEW YORK.
NEW YORK TO JAPAN, CHINA AND PHILIPPINES.



Smoking Room



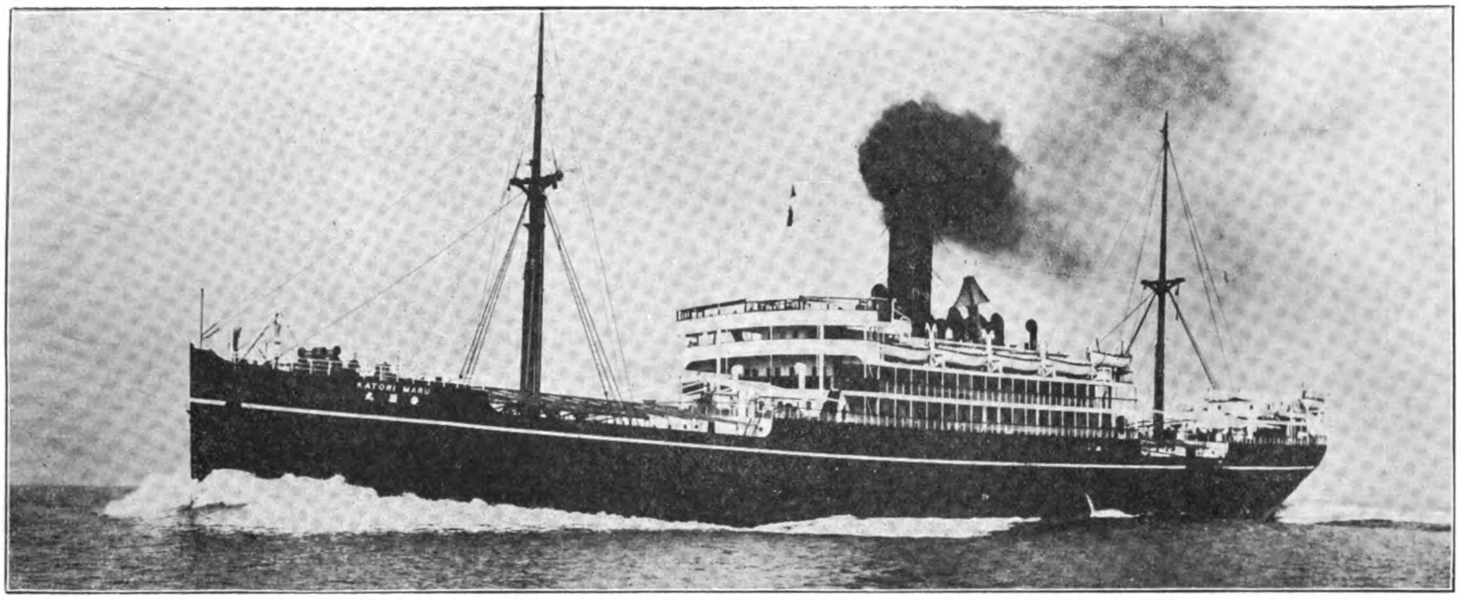
Dining Saloon



Social Hall

NIPPON YUSEN KAISHA

FLEET: 114 STEAMERS, 574,594 GROSS TONS



"KATORI MARU"

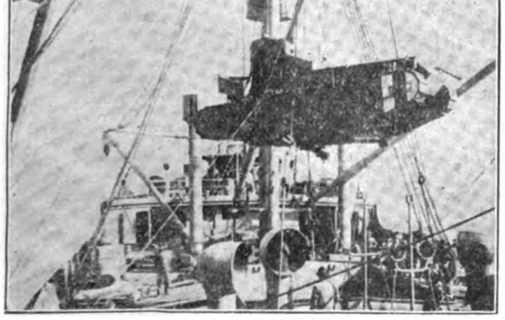
SEVEN SEAS

SHIPPERS WILL FIND QUICK DISPATCH, WITH WHARF, WAREHOUSE AND TERMINAL FACILITIES AT ALL PRINCIPAL PORTS SERVED BY N.Y.K. STEAMERS

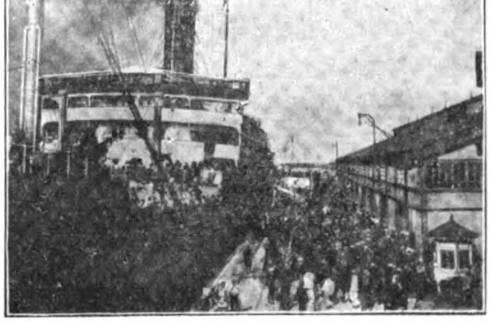
PRINCIPAL BRANCHES AND AGENCIES

Yokohama	Tokio	Nagoya	Keelung
Kobe	Moji	Nagasaki	Hankow
Hakodate	Otaru	Tientsin	Singapore
Tsingtao	Hongkong	Canton	Bombay
Penang	Colombo	Calcutta	Liverpool
Port Said	Marseilles	London	Chicago
Antwerp	Rotterdam	New York	Brisbane
Seattle	Manila	Townsville	Shanghai
Sydney	Melbourne	Osaka	

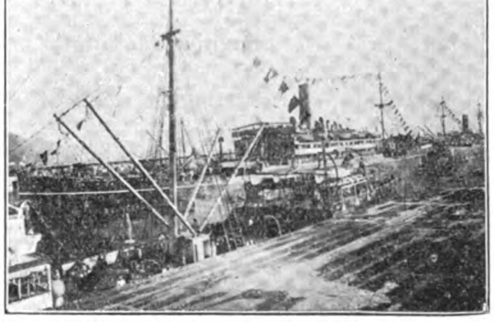
GIVE JAPANESE STEAMSHIPS THEIR SHARE OF YOUR JAPANESE CARRYING TRADE



Landing a Tank



Dock at Yokohama



Great Northern Dock at Seattle

Chartered Bank of India, Australia and China

INCORPORATED BY ROYAL CHARTER, 1853

Capital £3,000,000
Reserve Fund £3,700,000
Reserve Liabilities of Shareholders . £3,000,000

Head Office: 38 BISHOPSGATE, LONDON, E.C.
Shanghai Branch: 18 THE BUND.

Court of Directors:

SIR MONTAGU CORNISH TURNER, *Chairman.*
SIR DUNCAN CARMICHAEL
THOMAS CUTBERTSON, Esq.
SIR ALFRED DENT, K.C.M.G.
SIR WILLIAM HENRY NEVILLE GOSCHEN, K.B.E.
THE RIGHT HON. LORD GEORGE HAMILTON, G.C.S.I.
SIR JOHN NEWALL JORDAN, P.C., G.C.I.E., K.C.B., K.C.M.G.
WILLIAM FOOT MITCHELL, Esq.
JAMES MAXWELL GRANT PROPHIT, Esq.
LEWIS ALEXANDER WALLACE, Esq.

Chief Manager: W. E. PRESTON
Managers: J. S. BRUCE & G. MILLER

Bankers:

THE BANK OF ENGLAND.
THE LONDON JOINT CITY & MIDLAND BANK, LTD.
THE LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.
THE NATIONAL PROVINCIAL & UNION BANK OF ENGLAND, LTD.
THE NATIONAL BANK OF SCOTLAND, LTD.

Agencies and Branches:

Alor Star (Kedah)	Bombay	Colombo	Iloilo	Kuala-Lumpur (F.M.S.)	New York	Saigon	Taiping (F.M.S.)
	Calcutta	Delhi	Ipoh		Peking	Seremban	Tavoy
Amritsar	Canton	Haiphong	Karachi	Madras	Penang	Shanghai	L. Burma
Bangkok	Cawnpore	Hankow	Klang	Manila	Puket	Singapore	Tientsin
Batavia	Cebu	Hongkong	Kobe	Medan	Rangoon	Sourabaya	Yokohama

Drafts granted on the above Agencies and also on the principal Commercial Cities throughout the world. Bills of Exchange bought and received for collection. Travellers' Letters of Credit issued and every description of Banking and Exchange business undertaken.

C. J. SCOTT,
Manager.

ATTWATER & SONS

MANUFACTURERS OF ALL KINDS OF

STEAM ENGINE and HYDRAULIC PACKINGS

PRESTON'S PERFECT PACKING The Best Self-setting Wedge Packing made

SILVERINE METALLIC For Acids and Superheated Steam

ADMIRALTY ANTI-FRICTION in Skins, known also as "Sausage Packing" and

"Belleville Packing" The Best Floating Metallic Packing made

And all varieties of Frictionless, Graphited and Greasy Packings, made from

ITALIAN HEMP, ASBESTOS, COTTON, Etc.

Hopwood Street Mills, PRESTON, Eng. ESTABLISHED 1868

Telegrams: "Attwaters, Preston" *Telephone No.:* 1045 (2 lines) *Codes:* 5th Edition A.B.C., and Western Union

Sketched at Peking by Juel Madsen

SIR FRANCIS BEILBY ALSTON, C.B., K.C.M.G.

For the past twenty years identified with British policies in China and the Far East, and since 1919, British Minister at Peking. An able diplomat and sympathetic friend of China, who has been promoted to the rank of Ambassador and assigned to the Embassy at Buenos Aires.

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVIII SHANGHAI, OCTOBER, 1922 No. 10

America's Best Customer in Asia

PREVIOUS to the Washington conference the efforts of American financiers and business-men to reach a harmonious solution to our differences with Japan were invariably nullified by the counter activities of Americans in China. As often as our leaders of finance and industry succeeded in bridging the gap between the two nations the fruits of their labors were destroyed by renewed agitation against Japan originating in Peking or Shanghai. We thought that these practices had ceased with the signing of the four and nine-power treaties and Japan would be permitted to live up to her pledges without further nagging, but a recent incident discloses that influences are still at work to keep alive suspicions in the minds of Americans against the *bona-fides* of the Japanese government.

A syndicated article appeared recently in several American newspapers from a local correspondent disclosing that the executive committee of the American chamber of commerce at Shanghai had telegraphed the American minister at Peking urging him to carefully scrutinize the progress of the Sino-Japanese Shantung negotiations in order that American trade interests in that province might not be injured, in other words, to see that Japan did not "put over anything" that might close the door to American trade.

Now, THE FAR EASTERN REVIEW is in accord with any measure for the safeguarding of American rights and interests in this country, but we hold firmly to the belief that our national trade in its broader aspects cannot be advanced by continually impugning the motives and good faith of other nations. We are in hearty sympathy with every movement that tends to strengthen our commercial ties with China, but because of present financial and political conditions in this country, for some years to come our actual trade interests in Japan will be many times greater than our prospects in China. It will bring no lasting benefits to our manufacturers for their agents in this country to lend themselves directly or indirectly to keeping alive a propaganda which had its inception under the Wilson administration and received its quietus only when it had brought the nation to the brink of war with Japan. Americans in China should realize the truth of the old adage that the tail cannot wag the dog. The highest officials of our government and the most prominent of our business-men have stretched their hands across the Pacific to clasp those of their colleagues in Japan. The most perfect understanding exists between Hughes and Kato.

Now, Japan may or may not need watching in Shantung, but as far as American trade in general is concerned, it will be well to give careful heed to the trade returns between the two nations. It will give Americans in China something to think over, as it has the more serious minded of their countrymen at home. The recent publication of the trade returns for the fiscal year 1922, has opened the eyes of Americans to the importance of their trade with Japan and from all parts of the country editors are commenting on the surprising facts therein disclosed.

"Who," asks the *Pittsburg Dispatch*, "outside those directly interested, would suppose that the one important country whose trade with us in the past year, imports and exports, increased was Japan? Yet where our world imports show a fall in value of 28 per cent., those from Japan show a gain of 18 per cent., and where our world exports reveal a shrinkage in value of 42 per cent., those to Japan show an increase of 30 per cent. Japan sent us imports practically equal in value to all those from our neighbor, Canada, which led the list of our purchases. Japan was fourth in buying from us, being exceeded only by the United Kingdom, Canada and Germany; all of which bought less than the previous year, while Japan bought $59,000,000 more and sold us $54,000,000, more than in 1921. Our total trade with Japan in 1913 was only $150,000,000; in the year past it reached $550,000,000."

"Our imports were mostly raw silks; our exports there were largely raw cotton, but the manufactured articles we are selling the Japanese are rapidly increasing. The figures for 1922 are the more significant, when it is known that the prices of two principal articles of exchange, cotton and silk, were about the same as the year before, while all other articles were far below, showing a relatively larger increase in bulk than the value indicates."

The *New York Financial America* also summarizes the above in the following concise statement:—

"Japan is the one important country of the world with which our 1922 trade shows an increase. Our imports from the whole world in the fiscal year 1922, says the *Trade Record* of the National City Bank of New York, show a fall of 28 per cent. in value while from Japan alone, our imports show an increase of 18 per cent. The 1922 exports to the whole world show a reduction of 42 per cent. in value while those to Japan show an increase of 30 per cent. The imports from Japan in the fiscal year 1922 approximate $300,000,000 against $253,000,000 for the fiscal year 1921, and the exports to that country in 1922 were approximately $245,000,000 against $189,000,000 in the preceding year. This estimate of the 1922 trade with Japan, adds the *Trade Record*, is based upon official figures of 11 months while those of the trade with the whole world during the full fiscal year are official."

"If commerce and peace go together as suggested by Thomas Jefferson and proclaimed by Richard Cobden, surely our relations with Japan should be most ironic and cordial, says the *Boston Transcript* in commenting on the above figures.

"For our commercial relations with that country are to-day more favorable than with any other considerable land in all the world. It is the one country with which during the last fiscal year our commerce, in both imports and exports, increased."

"In such circumstances, there should be no thought of war between the two countries. 'Peace, commerce and honest friendship' were the relations which Jefferson wanted the United States to maintain with all nations. They do now prevail between us and Japan. And with the commercial relations so phenomenally prosperous and important, there ought to be no question concerning the other two."

The same sentiments are expressed by the *Pittsburg Chronicle Telegraph* which remarks that

"our trade with Japan has the unique distinction of increasing in both directions, while that with every other important country and with the world as a whole is decreasing. Each of the countries is of great and increasing importance to the other, in dollars and cents, in yen and sen. If commerce is associated with peace and honest friendship, then the bonds of peace and friendship between America and Japan should now be strengthening to a gratifying degree."

The great possibilities of the Japan market for our raw cotton, the opening of Japanese cotton buying houses in Texas combined with direct steamship connections which Gulf ports manufacturers expect will increase their sales to the Far East, leads the *Houston Post* to say that

"there are undoubtedly large possibilities for American trade with Japan, and the South has an especial opportunity to share in the benefits. Commercial relations will be enlarged as the political friction between the nations is removed, and they come to a better understanding of each other's peaceful intentions.

"The disarmament conference at Washington accomplished much for better relations between America and Japan. In fact, with the exception of bringing about the limitation of naval armaments by agreement, the development of a new feeling of friendship between these nations was the most important result of the conference.

"With the exercise of discretion and the spirit of fair play, the United States and her neighbor across the Pacific can build up a great trade between them which will be mutually profitable. Americans will be wise to follow the leadership of the buinsess man instead of the politician or the military alarmist in dealing with Japan."

From the Pacific northwest, Japan's purchases of lumber has been the one bright spot in an export trade that otherwise " was on the bum," and spelled prosperity to many concerns where losses were the order of the day. The *Tacoma Ledger* reflecting opinion in that quarter remarks :

" The Pacific coast is vitally interested in Asiatic trade. In fact, it is beginning to be recognized that this coast must look toward the other side of the western sea for the expansion of trade that will make it commercially great—it is in Asia that the commercial future of the Pacific coast lies. The phenomenal growth of trade with Japan during the present year may well be taken as an indication of what may be looked for as time passes, when Pacific coast shippers and manufacturers have worked for the upbuilding of markets of unusual promise.

"The figures are striking because of the fact that they demonstrate possibilities for the future. The Pacific Northwest, with its lumber and timber products, its grains and other staples, may well look more to the Orient for a market, and the course of trade during the past decade is ample assurance of commercial prosperity for the future if the Oriental markets, with their potentialities, are properly cultivated."

From other parts of the country comes the same refrain.

Simultaneous with the general interest displayed in the publication of the official trade returns, Secretary Denby arrived in the United States from his tour of the Orient, and gave Japan a clean bill of health with respect to her friendliness and attitude towards the four-power treaty. Mr. Denby said :

" I believe that Japan is living honorably to every detail of her obligations under both treaties. I was much impressed with the confidence exhibited by the Japanese in the success of the pacts and believe that Japan, as well as the United States, has come to realize that the new international arrangements in the Pacific are beneficial to everybody concerned. I also noticed similar feeling in China."

At a time when American editors were rejoicing over the closer understanding brought about through increased trade and a member of Harding's cabinet was hurrying home to testify to the good faith and honor of Japan, the American chamber of commerce of China is made to say by a publicity agent that Japan cannot be trusted to live up to her pledged word, without close scrutiny on the part of Americans.

At a time of great world trade depression when American exports to all other countries shrunk in value 42 per cent., those to Japan increased 30 per cent. As our best Asiatic customer, Japan turned the scale for many American manufacturers in one of the worst years in the history of world commerce. Under these conditions it is difficult to understand why Japan should bear special watching.

The trade returns quoted above, however, give only half the story. The real situation is revealed in a study of the trade of Japan with special reference to that with the United States published as a special monograph by the United States Tariff Commission, under the title " The Foreign Trade of Japan." In this new revised survey of the trade of Japan the statistical information has been brought up-to-date and new material included. Section four of this valuable report is devoted to a general study of the trade of the United States with Japan and includes a comparison of the relative value of the trade of each country, with war and post-war changes and a somewhat detailed analysis of the trade movements of the more important commodities and groups of commodities.

The remarkable fact is brought out that " notwithstanding the tremendous increase in trade with other Asiatic countries, especially as measured by percentages, Japan has been and is the main source of supply for the American imports coming from Asia. Since 1917, the imports from Japan to the United States have been about double those coming from any other Asiatic country. Correspondingly, Japan affords a larger market for the United States exports than any other Asiatic country, and in the more recent years the relative importance of this market for the United States has increased slightly. If the trade of Asiatic Russia, largely a war product, be excluded, during the last few years Japan has taken with an occasional exception, from three to five times as much of the American exports as has any other Asiatic country. China has been the second largest market for the United States exports in this region, according to official statistics, though falling far below Japan in this respect. However, a certain part of the United States exports to Japan is re-exported and finds an ultimate market in China or other Oriental countries."

It is difficult to go behind these figures. The official findings of the United States Tariff Commission supplements the trade returns for the past fiscal year and brings home to the American people the vast importance of their trade with Japan and of the necessity of preserving the most friendly relations with such a good customer. American trade with China has also assumed large proportions and will increase with the purchasing power of the people In time, no doubt, it will be the greatest market for manufactured products in Asia. Every legitimate means within our power should be employed to encourage its development, but if our gains in this direction are to be offset as the result of political agitation against Japan by a corresponding decrease in our trade with that country, it is simply transferring the profits from one pocket to another.

The report of the U. S. tariff commission will go far towards educating Americans to the fact that the vast latent possibilities of the Chinese market cannot be compared with the immense immediate profits awaiting our merchants and manufacturers in the Japan of to-day. The sober, common sense of the American people will insist upon a discontinuance of a campaign which tends to alienate the good-will and friendship of a customer whose trade, according to the highest expert advice, is worth three to five times as much as that of any other Asiatic country.

* * *

Keep All the Doors Open

It was eminently proper for the executive committee of the American chamber of commerce to suggest to its minister at Peking to watch the Shantung negotiations in order that their interests be not impaired, in the same way that similar resolutions on other matters are conveyed to the proper authorities, but it was eminently improper, to give this confidential resolution to a press correspondent who immediately utilized the information as the basis of a long article which conveyed to the minds of the people of the United States that Americans in China placed no confidence in the honor of Japan. As this is the second time within the year that confidential discussions of the executive committee of the American chamber of commerce have been immediately imparted to publicity agents of the Peking government, it is time that notice be taken of methods which for all practical purposes makes the chamber an adjunct to the Chinese publicity system. These tactics are out of date, opposed not only to the policy of the American government but to the higher interests of the American manufacturer at a time when his trade with Japan is the brightest signboard on the tortuous highway to prosperity.

Keeping the door open in China is a strenuous job, and for the past few years the watch-dogs of American commerce have been concentrating their attention upon the activities of Japan to the exclusion of other equally important trade matters in other parts of Asia. If the interests of the two or three *bona-fide* American concerns established in Shantung are of sufficient importance to move the executive committee of the American chamber of commerce to bestir itself to see that they are fully protected in open negotiations having for their object the restoration of the province to Chinese sovereignty, then the precedent should be followed in all similar diplomatic dealings between China and other governments. Not long ago, press dispatches from Peking carried the information that Foreign Minister Dr. Wellington Koo had ordered all the documents bearing on the Tibetan controversy to be gathered for his information preparatory to resuming negotiations with the British government for a settlement of this outstanding question. It would be eminently proper for the watch-dogs to introduce a resolution in the American chamber of commerce that these negotiations also be most minutely scrutinized for the

protection of American firms in Szechuan dealing in Tibetan produce, whose interests are equal to, if not greater, than those American firms operating in Shantung. There may be an American or near-American firm established in Gartok, in Gyangtze, or out in Kashgar, for all we know, whose interests demand that their rights to equal opportunity be not imparied in any negotiations between Great Britain and China, especially when the terms of the original Tibetan convention are called to mind. Within the next decade or so, the world will turn more and more to central Asia and the Roof of the World for its supply of valuable minerals and oil supplies, and the clause which closes this *eldorado* to foreign mining concessions would then constitute a most flagrant violation of the rights of Americans to equal opportunity in the development of this vast region.

The gold fields of Tibet are reputed to be enormously valuable, and with aerial transportation, the time may not be far distant when the world will draw on these hitherto untouched deposits. So Americans might as well bring this to the attention of their official representatives and insist upon close scrutiny of any negotiations between China and Great Britain, in fact, we ought to have a delegate sitting in at the meetings to be sure that nothing is " put over " that will help the climate to freeze us out of Tibet.

We are also positive that the interests of the few American trading concerns in Mongolia are of far greater importance than those of the two or three established in Shantung. Does not the most important American concern in China have its branches in Kalgan, Urga and elsewhere in Mongolia ? Did not Americans open up this country by establishing motor services across the wastes and are not various American concerns in Tientsin deeply interested in its development ? In order to play the game all around, the American chamber of commerce of China should call upon its minister to see that the Soviet does not close the door to American trade in this region. In order to support the policy of the American government laid down so emphatically during the organization of the consortium, Russia should be given firmly to understand that we will brook no nonsense in Mongolia, a most important part of the Chinese republic.

American trading interests are quite large in northern Manchuria and eastern Siberia and unless the American chamber of commerce does not wish to go on record as singling out Japan for their suspicions, the American minister should at once be invited to keep a close eye on the Changchun or any future negotiations. One never can tell about a government which forcibly takes possession of and drives American traders out of a vast territory and stations its troops in Urga in violation of China's sovereignty, especially after the American government was so explicit in defining the status of this territory when pressure was being exerted upon Japan to conform to our ideas. Why not bring a little pressure to bear upon Russia and the Far Eastern Republic to compel adherance to the consortium policies ?

And while we are at it, let us keep a weather eye on the future of American trade in Yunnan. We were recently asked by an American manufacturer what the chances of success were if he opened an agency in Yunnanfu, and would he receive equitable treatment on the Yunnan railway. As we were ignorant of the exact situation in this corner of China, we were unable to answer his question. Now, it would be highly commendable if the watchdogs of the " open door" would stop barking at Japan and concentrate their attention for awhile on these other matters. At least, let us be impartial in our suspicions and when we pass such resolutions let us give the same publicity to them as we did in the case of the Shantung affair. We are certain that the large American firms operating in Mongolia whose agents have been forced to flee before the ire of the Bolshevists will deeply appreciate such a resolution and the American firms up in Chungking, Tachienlu and Batang, not to mention the solitary trader in Gartok and the lone storekeeper at Gyangtze, will feel easier when they know that some one in Shanghai is keeping an eye on Great Britain in Tibet.

G. B. R.

SUN YAT-SEN

Will China Come Under the Influence of Germany and Russia, or Drift Into an Alliance with Japan ?

THE *Hongkong Telegraph*, in an " exposure " of Sun Yat-sen, says that the failure of one of his subordinates to burn certain secret documents as instructed by his chief, has led to the discovery of a startling scheme for the creation of a triple alliance between Germany, Russia and China, based, there is little doubt, on bolshevik ideals. The papers, according to the *Hongkong Telegraph*, are incriminating to the point of absolute conviction and show that Sun Yat-sen has been a prime mover in the scheme for the carrying out of which he has been indirectly in league with Admiral von Hintze, the former German minister to China. The *Telegraph* concludes its exposure of these documents by saying that all who value the integrity of China and who are anxious for the country's welfare should from now on hesitate to place faith in a man who works hand in glove, secretly and in dark ways, with the spreaders of doctrines of a most destructive character. In conclusion, the paper states, that it will be surprised if Sun Yat-sen is any longer permitted by the French authorities to reside in the French concession in Shanghai, where he is likely to carry on the negotiations which were somewhat abruptly terminated by the recent upheaval in Canton.

We are going to assume that the evidence unearthed by the *Hongkong Telegraph* is genuine. THE FAR EASTERN REVIEW has steadily supported the leader of Chinese liberalism for many years, because we are convinced to our satisfaction that he is honest, capable in many ways, and inspired with love of country and the establishment of principles that no honorable Anglo-Saxon can criticize. We have followed his career with a greater interest and sympathy perhaps than any other journalist, and are convinced that he has failed to receive a square deal either from Peking or from the outside. We have watched the campaign to discredit him from its inception in 1913, and can, if necessary, trace much of the malicious propaganda to its original sources. The pettiness of it all is disgusting.

If it should develop at this time that Dr. Sun Yat-sen is flirting with the Russians and Germans it is not strange when it is recalled that much of his political misfortunes are traceable directly to the intervention and meddling of other powers in the domestic affairs of China.

Dr. Sun started honest, friendly to the liberal powers of the west from whom he absorbed his political ideas, and with an earnest intention to apply a democratic form of government to China. He unselfishly resigned the provisional presidency in favor of Yuan in order to avoid further internal strife and accepted the difficult task of restoring China's sovereignty over her railway system. From the very start he was ridiculed and scoffed at as a dreamer, not so much because of the extent of his original scheme, but from the fact that his success meant the abolition of the closed sphere doctrine, the restoration to China of her sovereign rights to control her own transportation system. The advocates of special privilege saw

their hopes fade away with the development of Sun's plans and the concentration of future railway construction under one independent bureau removed from the influence of party politics and the pressure of the legations at Peking. Sun's success foreshadowed the collapse of the elaborate structure erected by foreign powers for the control of China's internal development, and under given conditions, the partition of the country into spheres of political control. It was natural that he should receive little sympathy from a foreign press intent upon defending the system which underlaid the policy of their various governments. Sun was called a dreamer, because no foreigner could visualize his plans from a patriotic Chinese viewpoint. No one can accuse Dr. Sun Yat-sen of being anti-British in those early days when he was trying to finance his railway scheme. As a matter of fact, the only beneficiary of his scheme was the British firm of Pauling & Company who received the contract for the Canton-Chungking railway, a fifteen hundred mile line, subsequently changed to the one from Shasi to Singyfu. When the news was cabled to London that he had started the second revolution and his powers were revoked, three other British firms were ready to sign agreements for thousand mile railway contracts on the same terms as those arranged between Pauling & Company and Dr. Sun Yat-sen. With the exception of one contract in France, British interests would have been the sole beneficiaries of Dr. Sun's much criticized scheme. Yet Sun's most bitter critics were certain British journalists who, as subsequent events have proven, were more interested in preserving the field for the official monopoly than in having independent British concerns enter into competition with it. By common consent, the advocates of special privilege came together to denounce him, sneer at him and undermine his reputation. The ball that was started rolling in 1912 has never stopped. The men who started the libel have stooped to the vilest calumny against their old friend in order to solidify their positions with their military employers.

Lured by the offer of fat jobs from the Peking government, many of his trusted lieutenants deserted his standard and justified their treason by proclaiming his incompetency in practical statesmanship. These men, many of whom are now occupying high positions throughout China, are his most bitter enemies, knowing that if he should emerge from his political campaigns as president or premier, their days of usefulness are numbered. Fear of the consequences, brings this group together in a solid phalanx to keep him down by any and all means within their power, and foreigners attached to them in one capacity or another have taken up the fight against Sun in order to preserve their own positions. This lies at the bottom of much of the hostility towards Sun Yat-sen.

During the first revolution, Sun Yat-sen was not unfriendly to Japan, in fact, several Japanese accompanied him to China and were attached to his staff at Nanking, much to the disgust of others who aspired to influence his policies. Dr. Sun realized better than any other Chinese official the great menace to China's integrity concealed in the unchangeable imperialistic policy of Russia and was the only Chinese that we know of who took to heart the rape of Mongolia and started a movement for its recovery. His much criticized financial scheme which contributed so largely to his loss of prestige as a practical statesman was devised to supply the funds for carrying on a military campaign against Russia for the recovery of Mongolia and the full restoration of China's sovereignty in the Ili and Sinkiang regions. Sun had no illusions about the ulterior motives of Russia and in all his railway schemes insisted upon the inclusion of lines which would terminate on the Siberian borders and open up Mongolia to the colonization of his countrymen. Too well indeed, did Dr. Sun sense that if Russian policy laid down so emphatically in the protest against the construction of the Chinchow-Aigun railway, was permitted to stand unchallenged, sooner or later Northern Manchuria, Mongolia and Sinkiang would be brought under the rule of the Czar. Russia had declared that the construction of any Chinese railway which endangered her strategic position along the Amur river would be considered as an unfriendly act, and this principle was extended to all other lines which might consolidate China's authority over her far-flung border lands. Russia could build railways that impinged upon the sovereignty of China, but China was prohibited the right of building any lines within her own borders which might in any way be construed by Russia as inimical to her plans of conquest. China was meat for the Bear, but to our certain knowledge not one Chinese official ever fully sensed the danger or took steps to save the nation from the menace, until Dr. Sun boldly traced the projected Mongolian railways deemed essential to the safety of his country. And in his subsequent exhaustive studies of China's development he elaborated these plans to show the necessity of opening Mongolia to Chinese colonization. There was nothing pro-Russian about Dr. Sun Yat-sen up to one year ago. If he has changed since then, there must be some good reason to explain such a *volte face*.

Let us go back to the original reorganization loan of 1913 forced through by the powers against the repeated protests of the Kuomintang and which provided Yuan Shih-kai with the millions to consolidate his power as dictator and enabled him to lay his plans for the overthrow of the one political party that opposed his dreams of autocratic rule. Dr. Sun had no illusions about the use these millions would be put to, and in the early days of 1913 sent telegram after telegram to London, Washington, Paris, and Berlin protesting against such an enormous advance to Yuan. President Wilson alone refused to join in this so-called administrative loan, though for reasons entirely of his own, and with little thought for the preservation of democracy in China. The loan went through and within a month the leader of the Kuomintang party (Sun Jao-ren) was murdered in cold blood by the emissaries of Yuan. Yuan's purpose was revealed and Sun started the second revolution, was defeated at the outset, proscribed, forced to flee the country and live in exile in Japan. The parliament was soon afterwards dissolved and the Kuomintang leaders and members hounded out of Peking or thrown into prison. The reorganization loan did exactly what Dr. Sun feared it would do. It killed democracy in China and ushered in the era of militarism which for ten years has desolated the country and brought the government face to face with bankruptcy and foreign intervention. Who was to blame? Let those who were foremost in supporting Yuan Shih-kai because they desired a "strong man" at the head of the government, search their consciences and answer it to their own satisfaction.

Then came the memorable days of 1917, when America entered the war against Germany and Wilson invited the neutrals to line up on the side of democracy.

China lay disorganized with the militaristic crew battening on the life blood of the people and striving to unloosen the purse strings of American financiers in order to add to their store of ill-gotten wealth. China had no heart for a war with Germany. She had no particular quarrel with that country and made clear her wish to be let alone. But foreigners in Peking playing upon her hopes and fears and holding out the inducement of being placed upon a plane of equality with Japan at the peace conference, forced the president to reluctantly sever relations with Germany.

Sun Yat-sen and his party were opposed to China's entrance into the war, not because of any special love for Germany, but from the fear that such a step would increase the power of the militarists and destroy any hope of reviving a parliamentary government. His fears were realized. Democracy in China received a set back from which it has not yet and may never recover. China did not enter the war of her own free will. The president was literally forced into it, bullied by the celebrated "Flying Wedge," and when all other suasion was found useless, was threatened with civil war in the Yangtze if he held out for neutrality. The hope of participating in the American war loans to the allies reconciled the Peking militarists to finally declaring hostilities, yet at all times the southern parliamentary party vigorously protested against a step they well knew would eliminate them as a factor in the government. The allies virtually placed Sun Yat-sen in a position where the force of circumstances brought upon him the suspicion of being pro-German. When the subsequent Japanese loans to Peking provided the funds for breaking the backbone of the parliamentary movement it told Dr. Sun that the cause of liberalism in China had

no friends amongst the nations who were loudly proclaiming their intention of making the world safe for democracy. At the very time that President Wilson was calling upon the manhood of America to make the great sacrifice in behalf of our ideals, the American minister at Peking, by forcing China into the war, effectively gave the death blow to democracy in China. Principles that applied in the west did not apply to the east. Democracy in China was crushed under the heel of a militant autocracy in order that democracy in Europe might triumph.

Up to 1918, Dr. Sun was most friendly to Japan, but when loan after loan was made by Nishihara to Peking, strengthening the power of the military autocrats and enabling them to carry on an active campaign to bring the south under subjection, his sentiments towards that country underwent a marked change. From a friendly ally he became a bitter enemy, and has since justified his uncompromising antagonism to any understanding with the north on the ground that the Peking authorities were sold body and soul to Japan.

It has never occurred to the Chinese or to the many foreign critics of Japan that these loans were eminently proper from the viewpoint of the Japanese government which was financing a partner under a "War Participation Pact" entered into for the express purpose of defending both China and Japan from the spread of bolshevism in eastern Asia. In the same manner that Great Britain first and America afterwards financed their allies in Europe, so Japan tried to build up an effective military force in eastern Asia for defense purposes. The menace from the north overshadowed in importance the long drawn out civil disturbances and revolutions in China and Japan had no option but to treat with the recognized government at Peking and bolster it up in order that it might co-operate in checking the onward rush of the red wave of terror. It is lamentable that much of the funds so advanced were employed against the south. It is the one reasonable complaint that Chinese or foreigners have the right to make against many of these much condemned Japanese war-loans to Peking. There may have been many ulterior motives behind these loans, we do not defend them, but the outstanding fact will remain that the Japanese government directed by a military premier, the highest officer of the army, was fully justified in time of war to take every precaution financial and strategic to assure the close co-operation of China's northern military leaders in any measures for the common defense of both nations in northern Manchuria and Mongolia, and, if in due course of time, the question of the validity of these loans is ever brought before an international tribunal, the verdict will be given to Japan. When the fierce opposition to these loans and the war participation pact is recalled, the impression is created that foreigners in Peking would gladly welcome the ascendency of Russia in eastern Asia rather than see China and Japan co-operate to protect their mutual interests.

On every side interference on the part of the allies only helped to perpetuate in China the system they were fighting to eradicate in Europe. Human nature being very much the same the world over, it is only natural that Dr. Sun and his friends should view with increasing suspicion the professed good-faith of nations who repudiated in Asia the principles they were struggling to uphold in Europe.

And when Dr. Sun went to Canton and established himself as president of the southern republic, determined to oppose force with force, he carried with him the enmity of nearly every foreign writer in China. Instead of a friendly or kindly word of encouragement or sympathy, any slight approval of the principles he was struggling to give effect to, principles that are dear to the heart of every Anglo-Saxon, upon which their very liberties and governments are founded and for the preservation of which they are willing at a moment's notice to lay down their lives, he was reviled, insulted, ridiculed and attacked from all angles. Not once was a friendly word uttered in his behalf by the Peking correspondents of a foreign press whose policies they influenced. Never in the history of journalism has such a malignant campaign been waged to destroy the character and standing of a political leader, as that directed against the protagonist of democracy in China.

Americans and Britons alike, men who cheerfully and proudly did their bit in France to uproot German military autocracy, on their return to China forgot the principles they hazarded their lives to uphold and joined in the pack that barked and yapped at Sun Yat-sen in order to ingratiate themselves with the military outlaws and freebooters who had usurped the power of government at Peking. Dr. Sun had his faults, but he stood for principles that demanded the respect and sympathy of all honest Americans and Britons. Betrayed, villified, hounded and distrusted by those whose doctrines of government he was struggling to implant in China, abandoned and condemned beforehand as a political adventurer by the representatives of the liberal powers at Peking, finding himself rejected by those he had every right to expect support from, can Dr. Sun Yat-sen be condemned, if he turned in desperation to Germany and Russia ?

Foreigners refused to recognize him as a leader of democracy: they stubbornly extended their recognition to the military oligarchy that is Peking, and denounced him as a political fakir, a firebrand, a Mazzini and an upstart demagog. If Sun Yat-sen turned towards socialism, or communism, and sought political leadership through the organization of the Chinese workers, who is to blame for his conversion, or backsliding ?

Since the Paris peace conference, THE FAR EASTERN REVIEW time and again, in season and out, has called attention to the trend of Russia and German policies in Central Asia. The only bulwark against the spread of bolshevism and the development of the Russo-Germanic designs in this region was the army of Nippon co-operating with the armies of China. An intense, blind jealousy of Japan brought all the allies together to frustrate such a combination. Japan's plans for the defense of eastern Asia against the "come-back" of a Teutonized Russia were vetoed by the powers, led by America. She was compelled to forego the military alliance with China and to surrender to the consortium her rights to defend herself. Japan was hamstrung in Manchuria and Mongolia while the way was opened and smoothed for the Soviet to take up the old policies of Russia where the ministers of the Czar left off. The consequence is seen in the occupation of Urga by a red army with the road open for further advances by the weakness of China and the withdrawal of Japanese troops from Siberia and northern Manchuria. With their eyes wide open, Britain, America and France made it impossible for Japan to guard their interests in eastern Asia and for all practical purposes invited the Soviet and Germany to step into the field and carry out their program in China.

Dr. Sun's deep rooted conviction that he is personally opposed by British interests and abandoned by America, and with his hatred towards Japan for her loans to the northern militarists, and with the knowledge that Japan's power for aggression has been circumscribed by the consortium pact and the Washington treaties, has prepared the way for Germany and the Soviet to bring him under their influence. Here we have the aftermath of ten years of bungling diplomacy, a decade of meddling with the affairs of China that has led to a situation portentious with grave events.

If Dr. Sun Yat-sen has actually reached some understanding with von Hintze and Moscow, and in time comes into power and brings about a Sino-Russo-Germanic alliance, who is to blame ? American and British jealousy made a Sino-Japanese understanding impossible and now they must face the possibility of a sovietized China directed from Berlin. Well may the meddlers of Peking tremble at the thought of the consequences. They have willed just such a catastrophe by their stubborn opposition to Japan.

We have stated a case without bias. We do not uphold Dr. Sun. If it turns out that the disclosures of the *Hongkong Telegraph* are true to fact, and it is proven that Dr. Sun has engaged in secret negotiations with Berlin and Moscow to bring about an alliance between the three nations, he forfeits any further sympathy and support from Americans, Britons and Japanese, but this cannot eliminate him from a front place in Chinese politics or prevent him

from carrying forward his program for organizing the workers of China along socialistic or even communistic lines. The damage has been done. Western liberals have turned their backs on the leader of Chinese democracy. They may have to pay the price, whatever it may be. By our meddling we have only made it harder for China. We have thrown the burden once more upon Japan who will be called upon to be the goat for the mistakes of a clique of professional agitators and literary diplomats.

It may be difficult to stem the socialistic or communistic movement in China, it may be impossible to keep Sun Yat-sen forever from acquiring power, and the day may well arrive when the bunglers of Peking will be face to face with the necessity of choosing between a China directed from Moscow and Berlin or one allied with Japan. The choice may have to be made. A sovietized China allied with Russia and Germany means the spread of the movement towards India, the goal of Russian and German political avarice. By their opposition to the renewal of the Anglo-Japanese alliance the British in China will find themselves in a serious predicament, compelled to choose between a China dominated by their traditional enemies or by the ally they discarded in order to cement their friendship with China. If such a time ever arrives and Japan is once more called upon to step into the breach, Great Britain will pay the price demanded by Japan. The question may well be asked, how far Japan is expected to sit by with her hands tied by pacts and agreements while Germany, Russia and China are preparing plans for her undoing ?

In our humble opinion, Americans and Britons in China have committed a grave error in rejecting Dr. Sun Yat-sen as the leader of China's republican movement. We incline to the belief that it is not too late to remedy the past by extending support to him. We believe that Sun Yat-sen would much rather march in harmony with the liberal nations of the west than with the radical powers of Europe, and that the time has arrived to call a halt to the campaign of villification that must have inclined him to listen to the overtures of the enemies of democracy. It is much better for America, for Great Britain and Japan to have Sun Yat-sen on their side than allied to their enemies. Sun is generous, big-hearted, and amenable to reason, to good advice. We cannot eliminate him as a factor in Chinese politics. We cannot break his hold over a large section of the masses of this country. Instead of alienating his friendship why not try the other method and cultivate and assist him in his herculean task of implanting a democratic form of government on the ruins of a military autocracy. It is much better this way than by forcing him into the arms of Berlin and Moscow, and having to face the possibility of asking Japan to defend our interests in eastern Asia. If the *Hongkong Telegraph* is correct, the choice lies before us.

G. B. R.

* * *

Since the above was written, Dr. Sun Yat-sen has issued a statement in which he admits having entered into the correspondence disclosed by the *Hongkong Telegraph*, but insists that the translation is garbled, and, as an offset to the charge that he is in favor of communism, invites attention to his recent work entitled "The International Development of China" which rests primarily on the support of the great financial powers. In his opinion, both Germany and Russia under their new forms of government have ceased to be a menace to the integrity of China and because of this he would have a more perfect working understanding with them. Dr. Sun, however, failed to make any mention of the presence of a large Russian force in Urga which has repeated the rape of 1912 by usurping the sovereign powers of China in Mongolia. He was ready to fight Russia at that time to restore the dependency to China, and staked his political reputation in a scheme for financing the army that was to drive the Russians back to the Urals. Dr. Sun seems to ignore that the continued presence of a large Russian force in that region must sooner or later give rise to complications that may not be so easy to settle by conferences around a table in some luxurious hotel. We see no reason to modify our opinions after reading his public statement. If Sun Yat-sen has been driven to seek a closer understanding with Germany and Russia is it not because Americans, and British have made it impossible for him to hope for any friendly support from the champions of democracy in the West ? Sun has one grand dream : the development of China, the building of railways, of ports, of factories, mills, steel plants and the opening of mines. This is his one obsession. It is hardly likely that he would jeopardize the industrial future of his country for the sake of an alliance or understanding with the two nations in the world who at this particular time are impotent to further his plans. We still believe that the best interests of America, of Great Britain, of France and Japan will be advanced by extending support to his plans for the unification of China under a liberal and democratic form of government.

Unifying American Interests in China

IF there is one thing that American interests in China need above all others it is unification, the will to pull together and work for the common good. For the past eighteen years we have lost opportunity after opportunity because of the absence of an intelligent and practical policy, and because clique after clique has attempted to impose its will upon the government. Some of the most promising and important projects which would have placed American interests in this country on a par with those of Great Britain, have been knifed by petty governmental jealousy and support to Wall Street favorites. For many years the big things of China have been maintained as a close preserve for special interests, and the interloper, the rank outsider, could hope for little support from officials in Washington allied with the system. Under the last administration American participation in the development of China became largely the particular perquisite of specially invited and favored combinations, with the consequence that the field became hermetically closed to large contracts requiring Chinese governmental guarantees. In purely commercial circles American policy has been moulded by a close inside combination which at times has resorted to the most questionable methods in order to force acceptance of its viewpoint. Common sense and sound business principles were swept away by a wave of sentiment, an appeal for Chinese trade based on political reasons. American business with the Chinese government has been conducted on a basis which reflects little credit on the judgement or ability of those responsible for the present situation.

The silly sentimentalism of a past *régime* in our Far Eastern diplomacy, brought us to the verge of war in the Pacific and it required the combined efforts of every sensible republican statesman to ward off the calamity and restore good relations with Japan. In the same manner, as Secretary of State Hughes was compelled to take heroic measures in diplomacy, so Secretary of Commerce Hoover is now forced to institute measures that will protect the investments and ensure payment for American materials delivered to the Chinese government at a time when we were officially advised that its credit was so good that no security was required for bonds sold on the American market, and that it had so much ready money that it could pay cash for everything it required.

The Chinese government now owes to American financial and manufacturing interests approximately $30,000,000 gold, and to

affect a unification of these debts, Secretary Hoover has appointed an advisory committee of industrial leaders, whose duty it will be to suggest a practical plan whose object is to place the American interests on an equal footing with those of France, England, Japan and other countries, which present a solid front when the interests of any national is concerned.

The personnel of the committee, which represents companies owning the major portion of the doubtful Chinese debts, is : M. A. Oudin, International General Electric Company, Schenectady, N. Y. ; Charles M. Muchnic, American Locomotive Company, New York ; E. S. Glines, Lam, Glines & Co., New York ; A. I. Esberg, vice-president of the San Francisco chamber of commerce, and Frank Waterhouse, Frank Waterhouse & Co., Seattle.

The foreign debt of the Chinese government is approximately $100,000,000, one-third of which is owing to American interests. The department of communications owes American concerns $16,000,000 gold for railway supplies, ministry of finance owes two American banks $11,000,000 gold for loans and $3,000,000 gold are scattered debts, all insufficiently secured and the stringent condition of the Chinese treasury makes its necessary that steps be taken to obtain more adequate security, at least.

The advisory committee will make a thorough study of the entire situation and make recommendations to Secretary Hoover regarding the interests of all American nationals and the best way to protect them. Mr. Hoover will then take the matter up with the department of state.

Heretofore, creditors of China in the United States have had more or less to look out for their own individual interests, while British interests have acted solidly through their effective organization backed up by a national trade policy. Other countries have combined their interests in like manner, thus being able to make a much deeper impression on the sorely harrassed Chinese financiers.

It is hoped that, when the Chinese begin receiving the additional revenues from the per cent. increase in import duty rate granted by "Nine Power Treaty on Chinese customs duties," a sufficient amount of these revenues will be appropriated to adequately secure American debts. By solid representation it is believed this can be brought about, and possibly interest charges secured.

Not only in the funding of present debts will the scheme benefit American interests. Instances have occurred where American concerns have been sorely handicapped by "crossing wires" in their dealings with the Chinese. One case was cited where one American firm, bidding on an electric tramway franchise in Harbin, had secured an option from the concessionaire and signed a preliminary contract. Another firm, also American, came in and made certain promises, and secured the contract. This threw the matter into a lawsuit, and the present status is that both American firms are very likely to lose the franchise to unified Japanese interests. Many such cases have occurred.

The committee will also act permanently in an advisory capacity to the Far Eastern division of the department of commerce in the dissemination of information received by that division. It will make a careful study of all matters appertaining to the Orient in order to be in a position to report on any matters put up to it by the department.

It is to be earnestly hoped that the appointment of this committee will be the first step towards a real unification of American interests in China that will extract American business from the mire of international politics and sentiment and place it on a sound practical working basis. As long as politicians, political advisers, propagandists, agitators and biassed sentimentalists are permitted to dominate or influence American business and financial matters in China, we can hope for little real progress.

Leonard Wood

LEONARD WOOD will remain at his post as governor-general of the Philippines "so long as he feels his presence is essential to the success of his program." This is his answer to the question of who will be his successor, a matter which has agitated political circles in Washington as the time drew nigh for him to enter upon his duties as president of the University of Pennsylvania.

Once again Leonard Wood sacrifices his ambitions and personal welfare in response to a call to public duty, sticking to the task he started until it is completed. His presence in the Far East the past year has been a Godsend to American prestige and influence. He has exerted a marked influence in stabilizing the uncertain international political situation. Working in close harmony with Warren in Tokyo and Schurman at Peking, the trio have been as towers of strength to Harding and Hughes in restoring the balance in the Pacific and infusing new life in American diplomacy. This phase of his work has been overshadowed by his accomplishments in the Philippines, but in our opinion it will stand as one of his greatest achievements.

From the time he started on his tour of investigation he made his influence felt for peace and harmony in the Pacific and at least one of our most prominent anti-Japanese leaders who was aboard the steamer which conveyed the Wood-Forbes party to the Orient experienced a change of heart. General Wood's trip through China where he saw conditions at first hand, and his subsequent visit to Tokyo was in reality the first step in making the Washington conference a success. In Tokyo, for the first time in the history of American-Japanese relations, the military leaders of both nations sat around a table and talked in the language that men understand. Both sides understood each other perfectly, and with a clear conception of each other's viewpoint, the way was paved for the diplomats to put on the finishing touches and write the pacts which have brought the two nations into the most harmonious relations. The return visit of General Tanaka, the leader of the military party in Japan, to Manila, cemented the understanding. The glory goes to the diplomats, but it is safe to say that if the preliminaries had not been thoroughly thrashed out by the fighting men, in which each side made known its irreducible minimum, the story of the Washington conference would remain to be written. This much, American prestige in Eastern Asia owes to the common-sense and broad-mindedness of Leonard Wood.

Aside altogether from the purely local aspects of Filipino reconstruction and politics, the presence of Wood in the Orient for the next three years is essential to the proper safe-guarding of national prestige. The Far East is in a state of ferment. China is chaotic, on the verge of breaking up through domestic strife. No one can foretell the immediate future. Foreign intervention may become necessary as a result of the complete breakdown of government in China. The Bolsheviki may grow bolder and swarm down from Urga, where it is admitted they have a force of 6,000 with another 50,000 stationed along the Mongolian borders. Against her wishes, Japan may be compelled to take action to protect her vital interests. The old order in Japan is gradually giving way before the advance of liberalism. Material changes may be expected in that capable country.

The centre of American power and influence in the Far East will remain in Manila and we must keep ourselves prepared to face any sudden change in the general Asiatic situation. It is vitally essential at this time, that we have a strong man in command in the Philippines, one who has the confidence and support of all parties

at home in the carrying out of American policies. The one man who has such a thorough grasp on the situation and who has already done so much towards rehabilitating American prestige in the islands and throughout the Orient, should remain at his post, prepared to meet any emergency that may arise. Americans in China need Wood in Manila fully as much as he is needed by those whose interests are more intimately interwoven with his immediate duties.

Already he has brought the islands back to a stable financial basis by rehabilitating the currency system and paring down the budget expenses. The oligarchy which dominated insular politics has been overthrown, the judiciary has been reformed, an efficient civil service established and public works pushed forward. Sanitation, hygiene and agriculture have been given a larger measure of official support and harbor works extended. Much has been accomplished. Much more remains to be done. The work of years was destroyed in a wave of sentiment, and it will take years to recover lost ground and restore to the islands the material prosperity and political stability that marked the close of the first era of American unselfishness in the rule of an alien people. From all angles Americans need Leonard Wood where he now is. The nation is to be congratulated that he is to remain to finish his task, until the time is ripe for his successor to take over and carry out his policies. When that time arrives, the situation will still demand a man of Wood's type to maintain the high standard he has set.

Pan-Pacific Conference

A REMARKABLE gathering is scheduled to be held in the centre of the Pacific Ocean this fall.

From October 25th to November 8th in Honolulu the "key men," in matters of commerce and finance, from the lands bordering the greatest of waters are to meet each other daily to formulate plans for future interracial co-operation in bringing about the development of those interests common to all the peoples of the Pacific area.

These men representing government departments or commercial bodies are being carefully selected from each country. They will be guests of the Pan-Pacific union. These delegates will represent the two-thirds of the world's population which is tributary to the shores of the Pacific Ocean. They realize that the Pacific is to be the future theatre of the world's commerce. They know that the traditions of peace that have always prevailed in the Pacific can best be maintained by the leaders of men in all lines of thought and action in Pacific lands meeting together and establishing among themselves a foundation of mutual confidence on which will be built co-operative effort.

Following the precedent established at the other conferences of Pan-Pacific scientists, educators and press men, called by the Pan-Pacific union, it is expected that President Harding will sound the key note of the commercial conference in his message, to be read by the governor of Hawaii at the opening of its sessions. Secretary of Commerce Herbert Hoover has already penned his message and is sending unofficial delegates as are the departments of agriculture, navy and interior in the United States, as well as the department of trade and commerce in Canada and the proper governmental departments in the other countries of the Pacific. Besides these delegates from governmental departments the U.S. chamber of commerce has appointed five delegates. It is understood that the president and secretary of the national foreign trade commerce will attend with a proper delegation from that body; the presidents of the Pacific coast city chambers of commerce propose attending with delegations composed of leading business men, while from Australia, New Zealand, China, Japan and other Pacific lands, financial organizations or boards of trade will send their leaders.

The presidents and premiers of Pacific lands are heads of the Pan-Pacific union, which, although an unofficial body, is supported in part by appropriations from Pacific governments. The state department has transmitted the invitation of the union to the Pacific governments to send their delegates and it is expected at this conference in Honolulu that a firm foundation will be laid for future friendly commercial understanding in the Pacific area.

An interesting feature of the conference will be the presence and participation on the part of the deans of a number of commercial colleges connected with Pacific universities—this at the request of Japan. It is said that throughout Pacific lands, including the United States, a full million men have taken or are taking foreign trade study courses. These men will guide the future commerce of the Pacific area, and their co-operation is desired by the commercial conference. Viscount Shibuzawa is organizing the Japanese delegation, and Hawkling Yen, one of the delegates to the Washington conference, with H. Y. Moh of the Shanghai chamber of commerce, the Chinese delegation. Manila and even far off Java on the edge of the Pacific expect to send their delegations, and Siberia has already appointed hers.

Alexander Hume Ford, director of the Pan-Pacific union, has made a tour of the United States and Canada in the interests of the conference and is now meeting in their home cities those who will attend from the Orient. Percy Hunter, one of the Australian founders of the union, has made a trip from London to Hawaii and back to Australia to interest that country in sending a representative delegation.

The delegates from the Pacific lands will be entertained in Hawaii for two weeks. Here they will be together all of the time and as all of the delegates will speak English, it is expected that many lasting international friendships will be brought about.

The American, Canadian and Latin delegates will sail from San Francisco on October 18th.

The chief topics to be discussed at the conference are communication and transportation, development and conservation of natural resources, finance and investments, inter-nation relations in the Pan-Pacific area.

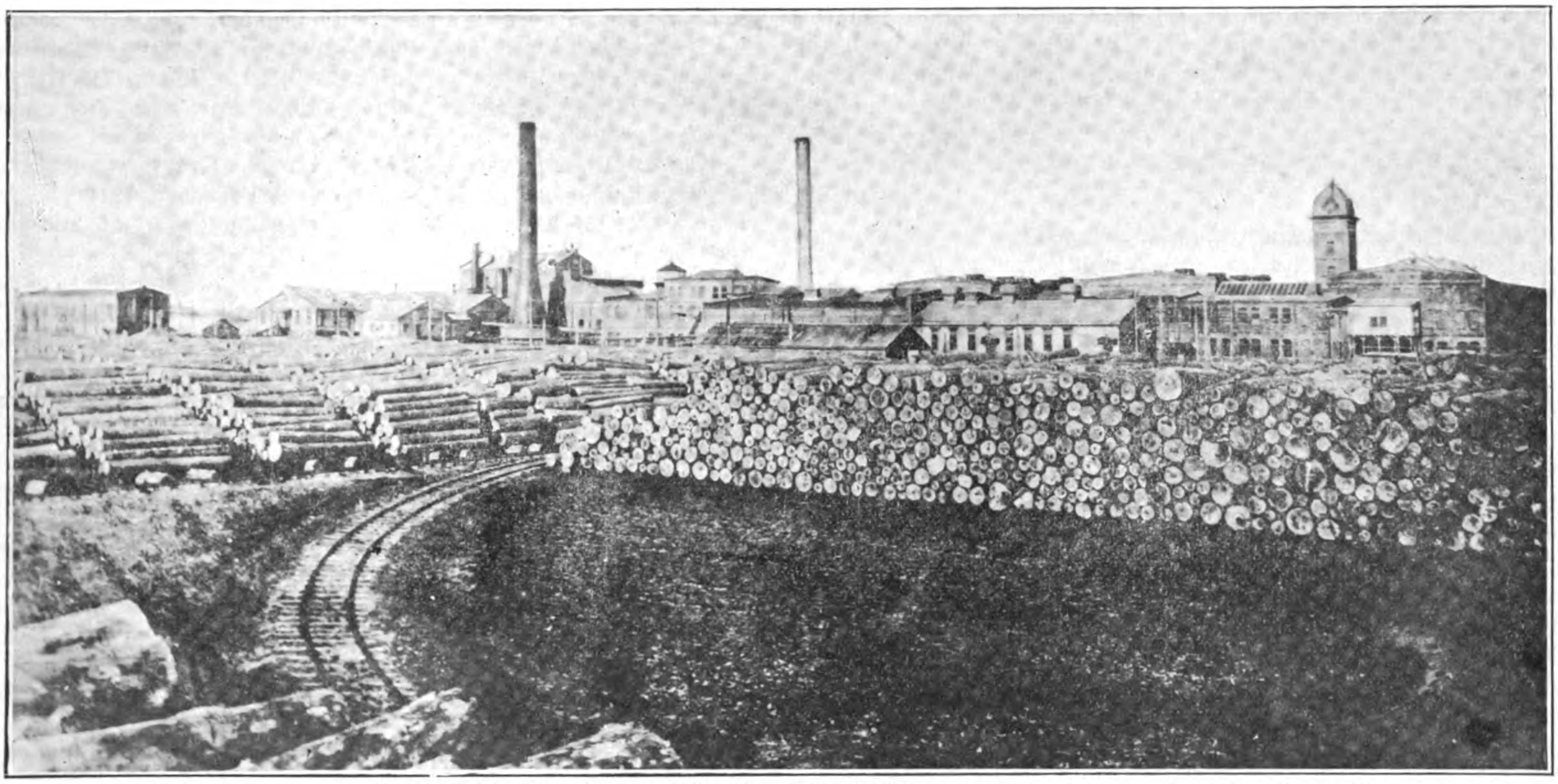
Four cabinet members and many men of highest standing in Pacific lands are preparing papers on these topics and it is expected that more than a hundred of the "key men" of the Pacific will attend the conference to further trade and commerce between Pacific lands.

Fuller will Build Dairen Hospital

THE contract for the design and construction of the Mantetsu General Hospital at Dairen, Manchuria, has been granted to the George A. Fuller Company of the Orient by the South Manchurian Railway Company. The hospital is to cost approximately Y.3,000,000 and its construction will require about two years.

The most serious problem faced in the construction of large buildings in Manchuria is the extreme cold winter weather, which prevents heavy construction during about half the year. The Fuller company has had considerable experience in putting up concrete and steel buildings in Canada, where construction has gone on when the mercury reached the extreme point of 40 degrees below zero, according to Mr. James Lee Kauffman, managing director of the branch company here, and with this experience it will inaugurate winter construction in Manchuria, where the temperature reaches that low mark.

Mr. H. A. Harris, managing director of the company, left for New York last Thursday to select the directing personnel for the work to be done in Dairen. Architects and structural and mechanical engineers will come at once to the Orient; to be followed by superintendents and foreign foremen. A staff of 16 or more foreigners will direct the construction and about 800 native laborers will be employed.



Oji Paper Company's New Mill at Tomakomai, Hokkaido, where 85,000 tons of news print paper is produced annually

The Development of a Great Industry

The Story of the Oji and Fuji Paper Companies

Oji Paper Manufacturing Co., Ltd.

IN 1872, the bureau of bank notes of the department of finance began to print bonds, notes and postage stamps, and a special printing section of the bureau was established. In order to supply the increased demand for foreign paper, the bank note bureau suggested to several private capitalists the advisability of building a factory for this purpose. As a result of this invitation, Jiroemon Mitsui, Saisaburo Shibusawa, Zenemon Ono, Hachiroemon Shimada, Junzo Saito, Risuke Minomura and Ichibei Furukawa promoted and organized the Shoshi Paper Manufacturing Co. in February, 1873, with a capital of Y.150,000. This was the parent of the present Oji Paper Manufacturing Co., Ltd.

In September 1874, construction of a mill at Oji village on the outskirts of Tokyo city, was begun under the direction of an English mechanical engineer, and an American paper expert. In December' 1874, the capital was increased to Y.250,000, and by June, 1875, the Oji factory was completed, and commenced operations in August. In April, 1876, the factory was honored by an inspection by H.M. the Emperor Mutsuhito (the late Emperor Meiji) the empress, and the empress-dowager.

In the meantime, a branch office had been opened in Yokohama, where a general printing business was carried one and later a similar establishment was opened in Tokyo, in order to consume the output of the mill. About 1878 or 1879 the circulation of newspapers and other periodicals became so great that the company discontinued its printing business, and engaged exclusively in the manufacture of paper.

From 1885 and 1886 the demand for all sorts of publications far outran the supply of paper. The Oji Company increased its capital to Y.500,000 in March, 1887, and a second mill was built at Oji. At the same time a small mill was constructed in Shidzuoka prefecture, where low-grade foreign paper was manufactured from pulp produced in the district. With the enactment of the new company laws, the company changed its name to the Oji Seishi K.K.

The Sino-Japanese war which stimulated the growth of newspapers in Japan, resulted in a rapid expansion of the paper industry. The Oji Company increased its capital to Y.1,100,000 in February, 1896, to Y.1,650,000 in April, 1897, and to Y.2,000,000 in November, 1899. A large spruce and hemlock forest owned by four villages in Shimo Ina-gun, Nagano prefecture, was then acquired and a new mill built at Nakabe, Sakuma Mura, Iwata-gun, Shizuoka prefecture. Since January, 1899, the company has devoted its whole capacity to the production of printing paper.

Later in the year, however, it was found that the company had over-extended its operations, and it became necessary to reduce the capital from Y.2,000,000 to Y.500,000. Since then its business has steadily prospered. For the past five years dividends at the rate of 25 per cent. per annum have been regularly paid the shareholders, and in addition to Y.10,450,000 set aside as reserve, more than Y.11,000,000 has been written off for depreciation since 1912.

With the demand for news during the Russo-Japanese war, the domestic mills were unable to meet the paper requirements, and the Oji Company increased its capital to Y.6,000,000, and erected a large mill at Tomakomai-machi, Yufutsu-gun, Iburi province, Hokkaido.

This mill is operated by hydro-electric power which the company generates from the waters of Shikotsu lake, which never freezes in winter, nor dries up in summer, like many lakes in the Hokkaido. The timber supplies are purchased from the imperial household forests, and the government reserves. The mill is considered to be the finest in the Orient, from the point of quantity of production and supply of materials.

Since the Tomakomai mill started operations, the imports of foreign newsprint have been greatly reduced. The greater part of the

paper used by newspapers in Japan is now supplied from this factory. The company prides itself on the fact that H.M. the Emperor Yoshihito inspected the Tomakomai mill when he visited the Hokkaido in September 1911.

Pulp Manufacture

In July, 1914, the Oji Company doubled its capital, purchased the Mitsui pulp mill in Karafuto and changed its name to Otomari Kojo, in order to manufacture chemical pulp and eliminate its importation. With the outbreak of the European war imports of pulp were greatly hampered by the difficulties of transportation. The demand, however, increased tremendously, and a new factory was built in Toyohara-machi, Karafuto, in December, 1915, and called the Toyohara Kojo. The Imperial Paper Manufacturing Company's mill in Osaka was purchased in February, 1916, and renamed the Osaka factory of the Oji Company. In June of the same year the paper manufacturing plants of the government printing office were purchased and renamed the Jujo Kojo.

In May, 1918, the capital was increased to Y.25,000,000. In December, 1917, a subsidiary company called the Chosen Paper Manufacturing Company was organized with a capital of Y.5,000,000 at Madendo, Kojomen Gishu-gun, Heian Hokudo, Korea, to manufacture sulphate pulp, using timber from the Yalu river zone. It is the pioneer in this industry in Korea.

In order to separate the pulp from the paper manufacturing end of the business, the pulp mills of the Oji Paper Manufacturing Company were turned over to the Karafuto Industrial Company, Limited, in July, 1918, and capitalized at Y.5,000,000. This company's head office is in Otomari-machi, Karafuto. In the same month, the Oji Paper Company bought up the shares of the Yukosha Kabushiki Kaisha, which with a capital of Y.2,000,000 was engaged in the manufacture of printing paper at Kameido, in Tokyo prefecture.

In October, 1920, the capital was increased to Y.50,000,000, and in December of the same year took over the business of the Hokkai Industrial Company, capitalized at Y.500,000, with its main office and factory in Fushiki-machi, Toyama prefecture. It manufactures ground pulp and printing paper.

A change of policy was made in May 1921, and in August the business of the Karafuto Industrial Company, Limited, was purchased, and in December the Chosen Paper Manufacturing Company was taken over by the main company, and its capital increased to Y.51,000,000. The two factories are now called the Karafuto Bunkojo and Chosen Bunkojo.

During 50 years or since the company was organized, its capital was increased from Y.150,000 to Y.51,000,000, of which Y.31,500,000 is paid up. It is the largest paper manufacturing company in Japan, and also one of world-wide importance.

The officers of this company are: President and Special Managing Director: Ginjiro Fujiwara; Managing Directors: K. Takashima, N. Takata, K. Ogasawara; Directors: S. Ohashi, N. Ariga, K. Hayashi, J. Horikoshi, K. Inoue, T. Adachi and J. Tanaka; Auditors: S. Nakai, H. Nishimura, Y. Hirose and K. Iida.

The important enterprises of this company and their equipment are given below:

OJI MILL: Situated at Ojimachi, Kita Toyoshima-gun, Tokyo prefecture.

No. 1. Mill, opened, August, 1875; No. 2 Mill, March, 1880; No. 3 Mill, September 1817.

Site: 11,047 *tsubo* (36 sq. ft). Brick buildings, one and three stories.

Paper Machines: Two 98-in and one 84-in. Fourdrinier machines. *Power*: Electric, 1,200 H.P.; Steam, 450 H.P.

Raw Materials: Rags, rice straw, pulp, produced by their own mills and imported. *Products*: Hook paper: *Annual Production*: 24,000,000 pounds.

JUJO MILL: Situated at Jujo, Oji-machi, Kita Toyoshima-gun, Tokyo prefecture.

Site: 48,377 *tsubo*. Brick buildings, one and two storied.

Paper Machines: One 100-in. and three 84-in. Fourdrinier machines. *Power*: Electric power, 1,340 H.P.; Steam, 740 H.P.

Raw Materials: Same as Oji Mill. *Products*: Book and post-card paper. *Annual Production*: 48,000,000 pounds.

OSAKA MILL: Situated at Zengenji-machi, Kita-ku, Osaka city.

Opened: November, 1914; purchased, February, 1916.

Site: 23,155 *tsubo*. Brick and wooden buildings, one and two storied.

Paper Machines: One 86-in. and two 74-in. Fourdrinier; One 96-in. and two 72-in. cylinder. *Power*: Electric, 2,732 H.P.; Steam, 345 H.P. *Product*: Book paper, cigarette paper, celluloid paper. *Annual Production*: 20,000-lbs.

KETA MILL: Situated at Keta, Keta-mura, Shuchi-gun, Shizuoka prefecture.

Opened: December, 1889.

Site: 16,968 *tsubo*. Brick and wooden buildings of one, two and three stories.

Paper Machines: One 78-in. Fourdrinier; one 72-in. cylinder. *Power*: Hydro-electric power, 488 H.P.

Raw Material: Spruce and a species of Hemlock known in Japanese as Toga: *Product*: Wrapping paper, match paper, etc. *Annual Output*: 7,000,000-lbs.

This mill also operates ground wood and sulphite mills producing pulp required by the paper mill.

NAKABE MILL: Situated at Sakuma-mura, Iwata-gun, Shizuoka prefecture.

Opened, January, 1899.

Paper Machines: One 88-in. Fourdrinier; one 72-in. cylinder. *Power*: Two steam engines, 35 H.P.; 6 turbine water wheels, 1,389 H.P. *Product*: Book paper, wrapping paper, etc. *Annual Output*: 9,000,000-lbs.

There are ground wood and sulphite mills manufacturing pulp required by the paper mill.

TOMAKOMAI MILL: Situated at Tomakomai-machi, Yufutsu-gun, Hokkaido.

Opened: September, 1910.

Paper Machines: Four 142-in., two 100-in. and two 98-in. Fourdrinier: *Power*: 16 steam engines, 2,880 H.P.; 3 water turbines, 1,210 H.P.; 4 Pelton water wheels, 1,800 H.P.; also uses electric power generated by other companies; operating 102 motors, 2,521 H.P.

Product: News print paper and wrapping paper. *Annual Output*: 150,000,000 pounds.

Attached to the paper mill, there is a large and up-to-date plants manufacturing the necessary quantity of ground wood and sulphite pulp.

SULPHITE PULP MILLS: The company operates three sulphite mills in Karafuto (Japanese Saghalien). Easy bleaching sulphite is turned out by these plants, comparing favorably with products of any first-class Scandinavian mill. The THREE STAR BRAND is well known in Japan and abroad.

ODOMARI MILL: Situated at Odomari-machi, Karafuto. *Product*: Easy bleaching sulphite pulp. *Annual Output*: 10,000 tons.

TOYOHARA MILL: Situated at Toyohara-machi, Karafuto. *Product*: Easy bleaching sulphite pulp. *Annual Output*: 20,000 tons. Wrapping paper. *Annual Output*: 6,000,000 pounds.

NODASAM MILL: Situated at Odasam-mura, Karafuto. *Product*: Easy bleaching sulphite pulp. *Annual Output*: 10,000 tons.

HYDRO-ELECTRIC ENTERPRISES: The Oji Paper Manufacturing Co., Ltd., also owns and operates five power stations generating 38,000 H.P. Power required by the paper and pulp mills at Tomakomai is supplied at low cost by these plants and what is left over is sold to different concerns for manufacturing and lighting purposes.

SUBSIDIARY COMPANIES: There are two subsidiary companies, whose operations are controlled by the Oji Paper Manufacturing Co.

KABUSHIKI KAISHA YUKOSHA, TOKYO: *Paper Machine*: One 60-in. Fourdrinier. *Product*: Book paper. *Annual Output*: 3,000,000 pounds.

HOKKAI KOGYO KABUSHIKI KAISHA, FUSHIKI: *Paper Machine*: One 100-in. Fourdrinier. *Product*: News print paper. *Annual Output*: 12,000,000 pounds.

The general office of the Oji Seishi Kabushiki Kaisha is at No. 9 Shinsaiwaicho, Shiba-ku, Tokyo.

Fuji Paper Manufacturing Co., Ltd.

The Fuji Paper Manufacturing Company was promoted in 1881 and on the advice of an influential government engineer it was decided to build a factory at the foot of Mt. Fuji where water supply and communications were good. This plan, however, had to be given up because of the financial depression due to the fall in the value of bank notes.

Shortly after this Ichiro Murata, one of the promoters, went to America to study the paper industry, and in August, 1887, returned to Japan and was able to interest the late Zensaburo Yasuda in his project. The Fuji Paper Manufacturing Company established in November, with a capital of Y.250,000, was the result. A building was constructed at No. 1 Itchome, Sanjikkenbori, Kyobashi-ku, Tokyo. It still remains the main office of the company. During the years of its operation the capital of the company has been increased eleven times, as shown in the following table :—

November, 1887	Y.250,000
May, 1889	500,000
January, 1891	1,000,000
January, 1894	1,500,000
July, 1897	2,300,000
April, 1906	4,600,000
December, 1906	10,000,000
November, 1916	15,000,000
February, 1917	21,000,000
March, 1919	24,100,000
December, 1919	35,150,000
June, 1922	37,550,000

The last capital increase in June, 1922, was made as the result of a merge with the Chemical Pulp Company, Limited, by which the Ochiai Factory in Karafuto came into possession of the Fuji Company.

The original Fuji factory was completed in 1889 and all kinds of paper manufactured. In 1897, the second mill was completed and placed in operation, and shortly after the Hokkaido Pulp Manufacturing Company was purchased and called the No. 4 factory. The business was so carefully directed that in 1891 the imperial household became one of the large shareholders in the company.

In 1908, after Mr. K. Ono became president, a mill was completed at Yebetsu in Hokkaido, and in November, 1915, the Shimoda Paper Manufacturing Works in Hyogo prefecture was purchased and called the Kanzaki Factory. A little while afterwards the Asahigawa Electric Company in the Hokkaido, was purchased and operated as an independent electric enterprise, supplying power to the company's factories, as well as to the general public. In October, 1917, a new pulp mill was completed at Ikeda in the Hokkaido.

The importance of the pulp industry had become so great by October, 1918, that a new company called the Fuji Pulp Company, Ltd. was organized to take over the Ikeda factory. In May, 1919, the Hokkaido Industrial Company was purchased and its factory called the Kushiro Factory.

At the present time the Fuji Paper Manufacturing Company owns the following mills :—

Fuji No. 1 Factory	Shizuoka Prefecture.
" " 2 "	"
" " 3 "	"
Shibakawa Factory	"
Kanzaki Factory	Hyogo Prefecture
Senju "	Tokyo Prefecture
Ebetsu "	Hokkaido
Kanayama "	"
Kushiro "	"
Ochiai "	"

Besides these, the Edogawa factory which has been under construction is nearly finished; the factory will be opened to business before long.

The officers are: President and Director: Heisaburo Okawa; Special Managing Director: Yohichi Anamizu; Managing Director: T. Takahashi; Directors: K. Suhara, K. Ono, E. Tanaka, K. Kumazawa, R. Ono and U. Tsukagoshi; Auditors: H. Sato, K. Koike and S. Wakao.

Machine Tools in Chinese Shops

By Sam Dean, Peking, China

MANY Americans do not know that there are in China several Chinese companies which make good gap lathes, drill presses and planers for rough work, and make them so cheaply that they supply practically all the repair shops of the country. Only the larger shops such as the railway shops have foreign tools, and these are mostly equipped with English machines.

There is a large and increasing demand in China for machine tools of the repair shop type, but the Chinese have to be educated to the fact that one good foreign tool is worth several cheap Chinese made machines. Perhaps the most popular American machine tool here is the lathe. This is rather too light for the work it is made to do, but accuracy doesn't matter on the jobs put through in most cases so it does fairly well.

The expensive machines with gear boxes, electric drives and all that are quite outside the present demand and pocket book. Now and then a large mill will buy good machine tools, but there are comparatively few such mills. However, every city now has an increasing number of small machine shops and this is the trade which has volume and now uses Chinese and Japanese goods. These shops are run in many cases by graduates of Chinese technical schools and Chinese technical schools are mostly equipped with Chinese or Japanese, or at most English made or German, made tools. Naturally the students buy for their own shops what they have learned to use. Also the schools with their small incomes buy the cheapest machines.

Personally, I feel that there are two lines which American machine tool manufacturers could follow in order to get the Chinese market. One is to put their tools in technical schools out here at prices that would enable them to be bought, rather than shoddy Japanese or Chinese machines. The other is to find out the companies that are supplying the Chinese repair shops with machines and in these shops at least work hard to put in American machines. I doubt very much whether we can compete with the Chinese made machine for the makeshift repair shop, but we certainly ought to be able to furnish the machines that make China's machine tools.—*American Machinist.*

Menace to Travel in Manchuria

Train Wrecking as a Pastime or a Policy?

BENEATH the sedate exterior of the South Manchuria Railway, an important link of the world's highway of travel, there lurks a treacherous demon, looking for a chance to tamper with the railway traffic to the serious menace of life and property, says a recent official report on the wreck of the south-bound express.

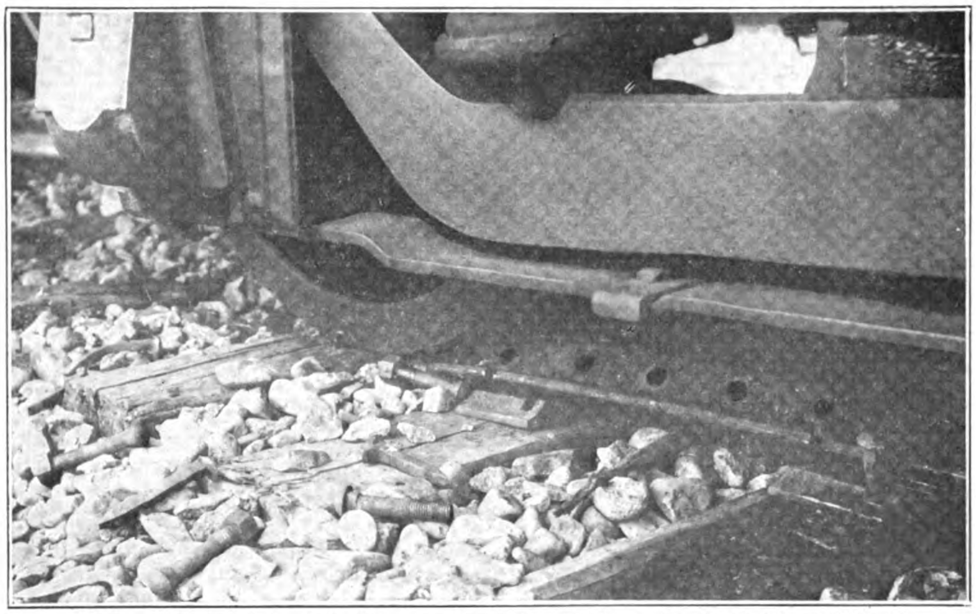
This is highly regrettable, but, with all the efforts of the railway authorities, the hopes of the traveling public to eliminate these menaces may be slow to be fulfilled.

In fact, interferences with the South Manchuria Railway traffic have been attempted with annoying frequency, but such attempts have in most cases been frustrated through the joint co-operation of the railway people, the police and the Japanese railway guard.

None of the dastardly plots to interfere with the railway traffic has been so ingenious in conception and in execution as the fatal train wrecking that occurred between Mukden and Wenkuantun, a wayside station just north of Mukden, on August 14th, 1922.

The wreckers went about their business that time with a scientific dexterity.

It is significant that robbery was plainly not the object of the wreckers, for no passengers were molested, though the first and second-class coaches were brought to a standstill in a lonely district in the pitch dark of late night.



All the six bolts of the fish-plate, together with all the spikes for half a rail length were found removed and the bolts on the next fish-plate loosened

How the Wreck Took Place

The south-bound express train leaving Changchun at 5 p.m. on August 14th and due at Mukden at 11.20 p.m. passed Wenkuantun station at the scheduled hour and was rounding a gentle curve at 407.650 kilometres north of Dairen, when, with a strange sound, the train shot sideways about 70 metres ; the locomotive with two third-class passenger cars were overturned ; the dining car, together with two first and second-class cars, were also derailed, but were only tilted.

The Japanese stoker was burnt all over the body by the hot water of the boiler and was killed on the spot ; the Japanese driver got burnt in both legs and face and died in hospital ; the Chinese help was also burnt sustaining light injury ; in addition, one of the dining car attendants and two of the passengers were slightly injured.

That the two sleeping cars and the mail car attached to the train escaped scot free, and that the injuries to the passengers were only nominal were owing to the Japanese driver's caution in his knowledge that that particular section is exposed to interferences by mischief makers. No sooner than his car caught the strange sound, he at once brought the emergency brake to play. But for his presence of mind and loyalty to his duty, the consequences to the passengers would have been too terrible to contemplate, especially as the train was then running at the speed of forty miles an hour.

There has never been a shadow of doubt as to the object of the train wreckers. Their sole aim lay in interfering with the train traffic. The point, at which the wreckage took place, was in a curve. All the six bolts of the outside rail, together with all the spikes for about half the rail, had been found removed. Besides, all the bolts for the adjoining splice, too, were found loosened.

The fact that the outer rails in the bend were chosen, coupled with the fact that the work was done in the space of forty minutes between the time of the last patrols going their regular nocturnal round and the time of the express train to pass the point, indicate that such a feat could not be accomplished by a group of men not fewer than ten, equipped with some amount of technical knowledge and experience.

Instances of interference with the track and theft of accessories on the South Manchuria Railway lines have been many, especially about Mukden, as may be shown in the list.

1922. January 5, Hunho-Mukden, 395-396 kilometres from Dairen, 2 pieces of telegraphic copper wires (80 metres) stolen ; January 17, at km. 394, 100 metres of wires stolen ; February 10, kms. 405, spikes driven into the space between rails at the joint ; March 7, km. 403, a stone weighing about 42-lbs. laid on the track ; March 28, km. 403, come thirty small-sized stones laid on the track ; April 5, km. 405, while a detail of railway patrols was on one of their rounds, they noticed three Chinese soldiers and two Chinese coolies placing a couple of stones weighing 25-lbs. or so. The coolies were captured and the Chinese soldiers were called upon to explain. They were going to be taken to the guards' box when about 70 or 80 Chinese soldiers gathered and attacked the Japanese soldiers and went away. April 14, km. 400, about 30 small stones were placed on the rail track. April 16, near km. 400, about 15 small stones laid on the rail ; July 17, near km. 406 (between Mukden and Wenkuantun), small rocks laid on the rail; July 18, near km. 404, small rocks laid on the rail and some Chinese soldiers were noticed looking on. August 2, near km. 395 (between Mukden and Hunho), 36 kilogrammes of telegraphic copper wire stolen ; August 14, km. 407, train derailed with fatal results as above stated. August 23, km. 400 (at level crossing), as train No. 44 was in motion, a stone of the size of a man's fist was thrown at the train by one of a group of seven or eight Chinese, the window pane of the caboose car was smashed, and the conductor injured.

A Street in the French Concession at Tientsin; Russian Church in the distance

Tientsin's Native Industries

The Turning Point of Chinese Industry

By O. D. Rasmussen

WORLD economics of the past four years, the rise and fall of silver, the piece goods crisis, the attempted boycott of Japanese goods by Chinese in 1919 and 1920, and kindred polito-commercial difficulties, have served to effectively bring home to the Chinese their dependency on foreign supply for the satisfaction of their daily needs.

The realization of this unsatisfactory state of affairs, and its utilization in bringing about a new outlook towards native economics may be said to have formed a turning point in the history of Chinese industry. The failure, either by lack of materials or by excessive prices, of European and American sources of supply, because of disturbed financial and labor conditions, has revealed to the Chinese, forced to fall back on their own resources, how inadequate their own industries have been to meet the requirements, in quality, quantity and design, of the home demand.

Chinese manufacturers, financiers and business men, aware of the opportunity of wealth in the productive field of native manufacturing, lost little time in translating it to action. Now one sees on every hand indications of increasing volume of native manufactured goods, of old factories regenerating and of enlargements, extensions and of a general industrial expansion. The native and a few foreign stores now stock such diverse manufactures as silk stockings, dolls and tennis rackets, cigarettes, soap, matches and electric fittings, manufactured by Chinese factories by entirely native supervision, materials and labor.

The executive and constuctive brains of the country are now concentrated, not upon the age-long effort to amass money and increase private riches from existing wealth, but upon the production of new wealth from the manufacture of goods to meet wants arising out of the rapidly rising standard of living.

The study of native industry is encouraging. It refutes the argument that Chinese are not capable of organizing and administering an efficient business institution. Of the few factories brought under observation, there are signs that their organization has to contend with unnecessary depreciation of machinery, through lack of intelligent operation by workmen, but apart from this, which will be taken care of by the growth of a skilled and educated mechanical class, there are no indications that Chinese manufactures are not destined to reach a high standard in the world's products.

At the time of writing the government bureau of economic information announces that the ministry of agriculture and commerce has circularised the provincial industrial commissioners that it has decided to issue certificates of merit to Chinese manufacturers on conditions that their product must be : (1) a new invention, (2) manufactured from native raw material, and (3) of a quality similar to that of foreign importation. This is obviously a step in the right direction and shows quite distinctly what the Chinese have for their goal.

As regards the position between capital and labor there is not the same encouraging outlook. The situation claims much more treatment than can be given under this head, but it will suffice in this connection to refer to general conditions as they reflect upon the native industries.

Advance in the status and environment of laborers has not kept pace with the development of machinery. In fact, in the main, it might be said that no advance whatever has been made in the large majority of factories. Hours, wages and surroundings are still on the primitive native basis. They form the nucleus of a future struggle between capital and labor, and are identical with conditions fifty years ago in foreign countries, where the conflict is now at its height.

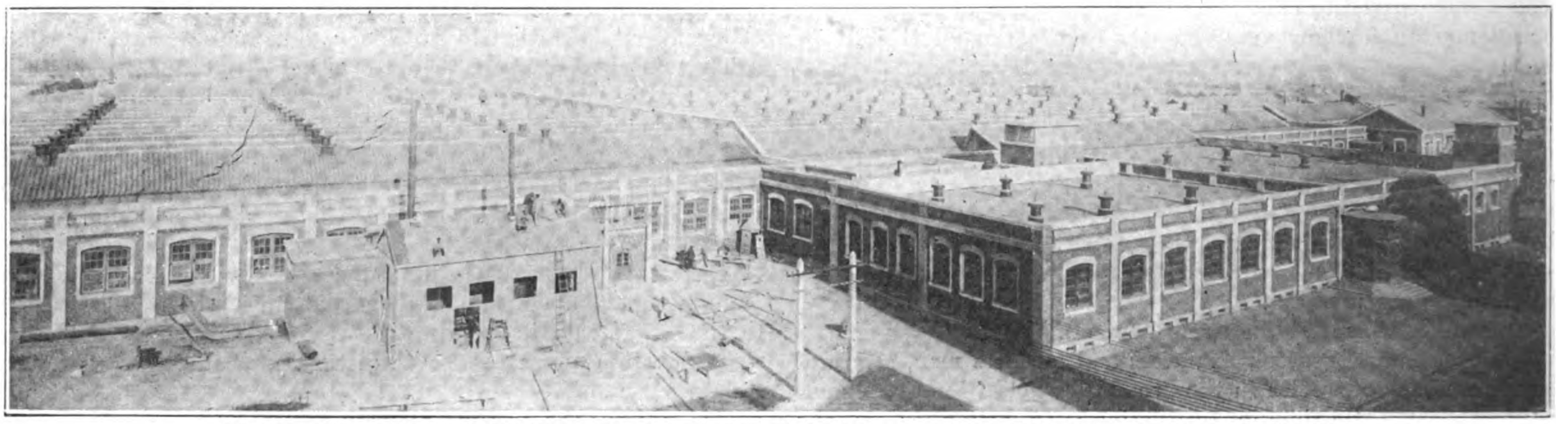
Handsome new Buildings in Tientsin; Office of Fearon, Daniel & Co. at Right

While manifestations of unrest are not apparent in these native factories, there still exist the factors which form the roots of trouble, factors which, when seized upon by propagandists of the type of bolshevist now strongly entrenched in Shanghai and Peking, are capable of unlimited magnification.

The Chinese capitalists, if we can class them as such, are not conscious of exploiting human labor, as foreign lands have come to recognize it. They hire and accommodate laborers after the custom and fashion peculiar to each individual craft, with no particular reservations or limitations not common to all engaged in that trade. Standards of living and factors which bear upon them are not the same in all parts of the country. In Shanghai the price of rice is most important, whereas in Tientsin and neighborhood rice is not the principal staple, and its fluctuations make scarcely any appreciable difference in the cost of food.

Raw Cotton for the Busy Mills at Tientsin

But while not committing intentional exploitation, nevertheless the Chinese, and the foreign employer as well, are omitting efforts to ameliorate the conditions. A large problem of economics surrounds this question, but reduced to simple terms it means that the onus of raising the standard of living is on the employers. It rests upon their initiative to raise the selling price, reduce profits to a fair minimum and keep wages on a fair living scale. It is easy to write it, we are aware, but, sooner or later, the problem has to be faced, and it cannot be too soon to keep pace with swiftly moving events.



The New Heng Yuen Textile Mill at Tientsin, equipped by Andersen, Meyer & Co. with American Machinery

Chinese labor conditions are low, but they have been on a par with the Chinese living costs. They can move only in one direction and that is upwards. Intelligent anticipation will avert catastrophes, which the kindergarten industry of China cannot well afford to meet, and intelligent foresight can come only from those prepared and able by virtue of education and wealth to exercise it. If employers wait for labor to extort what they feel to be a reasonable portion of capital to pursue their right to happiness, the toll will be higher.

China needs, almost above anything else at the present time, a bureau of labor, the duties of which should be to collect and analyse statistics of conditions facing both workmen and employers. It should be able, among other things, to form commissions of inquiry into current disputes and be at the service of all *bonâ fide* inquirers, for a nominal fee, in connection with growing problems. Out of its findings and experience might come the nucleus of comprehensive labor legislation, concerning hours, wages, child and woman labor, factory conditions, hygiene, sanitation and allied conditions.

Cotton Yarn

THE YU YUAN FANG CHIH KUNG SSU, located just outside the ex-German concession at Hsiao Liu Chuang, was established in 1916 and commenced work in March, 1918. It originally was part Japanese but now it is said to be entirely Chinese owned, and is capitalised at $3,500,000 Chinese currency, the estimated cost of present buildings and plant being about $3,000,000. The machinery is entirely American (Saco-Lowell) purchased through Andersen, Meyer & Company. The mill runs 50,000 spindles with 50,000 more to be added next year. Just at present 25,000 spindles are working day and night with an average output of 24,000 pounds per 24 hours, single thread, 16s. and 20s. The raw cotton used is entirely native which, because of the shortness of fibre and coarseness, produces a hard thread.

The factory employs about 1,400 hands of whom 1,000 are boys between the ages of 13 and 17 years. There are two shifts of 11½ hours each; no Sunday work. The average boy's wage is 20 cents a day, and a man's wage averages about 40 cents. The chief engineer is Japanese. Practically no women are employed as Tientsin women are inexperienced and feel mill work to be a disgrace. Good housing is furnished for those who wish it in the Chinese village in an enclosed compound outside the mill. A doctor is on the regular staff, and a small hospital has been erected. This mill is modern in every respect, and factory conditions under which

Chinese Brick Kiln on the Hai-ho

the laborer works as a whole are good in the matter of sanitation and light.

THE HUA HSING FANG CHIH KUNG SSU was erected in North Tientsin (Ho Pei) in 1917-1918 and commenced operations in January, 1919. It is equipped with 25,000 spindles (Saco-Lowell) through Andersen, Meyer & Company and produces yarn from 10s. to 20s. similar to that of the Yu Yuan Textile Company. The average output is 25,000 pounds per day. The mill employs about 1,600 workmen in two shifts of 12 hours each—one change of shift per week. Women employed number about 700 brought from Shanghai. Boys employed number about 200. A statement of wages was not obtainable, but they may safely be estimated at a little more than those paid at the Yu Yuan mill as it was stated that no housing is provided. The mill contemplates installing cloth weaving machinery. Conditions here are not so good as at the Yu Yuan, the mill not even stopping during the meal hours, neither are the buildings as well lighted nor kept as clean.

Native Loom, Tientsin

THE HENG YUAN FANG CHIH KUNG SSU, Ho Pei, Tientsin.—Machinery is from the Saco-Lowell shops purchased through Andersen, Meyer & Co. It will manufacture 8s. to 20s. yarn. The capitalization is said to be $3,000,000 and the factory is quite up-to-date in every respect.

Tientsin's Chinese Industries

Cotton Cloth

All cotton cloth weaving establishments in Tientsin are run by man power, and as such they range from one or two looms (native and Japanese make) in a house to 50 or 60 in so called factories with hired labor or apprentices. There are from 100 to 150 such weaving establishments, but none of them are factories in the modern sense. Ho Chia Ho—that small section of the native city between Ku I Chieh and the Yu Ho—is the location of a great number of them, every hutung and lane displaying numerous imposing signs, and the air resounding with the hum of flying shuttles and blatter of looms from small Chinese buildings behind the walls. Most of these factories also call themselves dyeing works, each one dyeing its own cloths and yarns and specializing in its own particular designs and qualities of cloth, although none have a monopoly of a particular style. Many of the products are excellent in coloring, design and quality considering that they are made by man-power looms, and compare very favorably with foreign machine-made products. These native cloths include coarse and fine nankeens dyed in the piece, grey shirting, colored shirtings dyed in the thread, imitation ticking, figured cottons, bed coverings, cloths with crimp designs, drills, canvas selling by weight, mercerized cloths woven from foreign cotton and rhea thread, and brocades with as good a finish as a foreign-made product.

Lumber Yards in the Italian Concession, Tientsin

One of the largest of these establishments is the CHUNG HUA SHIH YEH CHIH JAN KUNG CH'ANG, established seven years ago, capital $ 20,000, with three factories, one for dyeing and two for weaving. These factories are typical Chinese houses, poorly lighted, dirty and with earthen floors. There are 150 workmen employed. Wages are paid by the piece, although in some of the other establishments wages are paid by the day or month, housing and food being included or excluded according to circumstances. In this particular factory an average wage of $0.50 a piece of 21 yards is paid, weavers of plain cloths getting a smaller wage than those weaving fancy cloths. A good workman will weave one piece of ordinary designed cloth a day. Hours of work are not fixed but average 12 per day. A market for this factory's product is found as far south as Shanghai and Nanking.

THE I CHANG FAN PU KUNG SSU specializes in canvas. It was established in 1913, capital $100,000. The factory proper is a large room, Chinese style, well lighted, brick floor, cleaner than the average factory, and efficiently managed, 300 apprentices, most of them boys, are employed with housing and food provided. Wages are paid by the piece in excess of 320 yards per month. The working day is 12 hours. The cotton canvas produced is of good quality.

Match Factories

There are two large Chinese-owned match factories in Tientsin, the TAN HUA HUO TS'AI KUNG SSU and the PEI YANG HUO TS'AI KUNG SSU. The latter was built in 1906 and now operates two factories, the original one on the banks of the Yu Ho and the new one, built in 1914 at Nan Kai. The total number of workmen employed is about 1,350. Of these, about 1,000 are outsiders and 350 live on the premises with food provided. There are 12 hours of work a day; the average wage is 30-50 cents; half-day's holiday on Sundays. Rest hours during the working day are from 8.00-8.30 a.m., 12.00-1.00 at noon, and 4.00-4.15 p.m. A number of women and girls are employed in packing the match boxes. Chemical materials come from abroad; match splints from Japan and Manchuria.

Two grades of matches are made, a first quality which is a safety match, and a second quality which is not a safety match but which is in popular use among the Chinese because of its cheapness—about seven cash per box of about 150 matches. The machines used are Japanese made and are run by

man power. Conditions of labor are dangerous and very unhealthy. The factory is poorly constructed; ventilation to carry off the strong fumes is poorly arranged; and there are few safeguards against fires (matches constantly ignite and the fires are extinguished by small boys with brooms). Most of the workmen are boys and young men.

In spite of bad laboring conditions in the factory itself, the Chinese homes in the vicinity of the mill are an improvement over the average lower class home seen in China and reveal a higher standard of living.

Glass Factories

THE MING CHING PO LI KUNG SSU began operations in August, 1919, in answer to the demand for window panes of non-Japanese manufactures, a great deal of the local demand being met by Japanese products from Shantung. This factory at present has an output of 40 cases per day to be increased later to 60 cases per day, each case containing 100 square feet of window-glass of good quality,—three colors, blue, green and white. Manufacture of other kinds of glassware is not contemplated. The present product is selling at $14 to $16 per case. The factory is poorly constructed—typically Chinese:—there are two work shifts of 10 hours each; no Sunday work; 30 skilled workmen from Shantung; wages $30 to $60 per month.

THE TA HSING LIAO CH'I KUNG SSU began operations in 1912; capital; $6,000 and for some yeaгs produced only lamp chimneys, bottles, globes, etc. In the fall of 1919, it also began to make window glass. There are about 150 workmen employed; of these, the window-glass blowers come from Shantung and command wages of from $10-$50 per month, 10-12 hours work per day, most of them boys, are local men, and work longer hours with wages running from $10-30 per month. Food and housing are provided. Factory conditions are bad. The glassware produced is not of very good quality as compared with a foreign product from America and England, but it is cheaper and better than Japanese-made goods of the same class. In addition to the above factories, there are the Kung Chi Po Li Ch'ang Li, West Tientsin, and the Chung Li Liao Ch'i Ch'ang, established in 1913 at Ho Pei but at present not working. A new window-glass factory, the Pei Yang Po Li Kung Ssu, is just in process of erection at Ho Pei.

Egg Products

YUNG CHI TAN CH'ANG and TA HSIN TAN CH'ANG.—The prepared egg industry in this district was started several years ago and was in a flourishing condition up to 1918 when it was for a time affected by various food laws of several importing countries, particularly America. In 1917, over five million pounds of egg albumen and yolk, dried and moist, were exported from Tientsin, and in 1918, only two million pounds. On the other hand fresh eggs increased in export by five and one half million pieces over that of 1917. The American food laws rule that dried egg products containing more than one hundred milligrams of metal to the kilogram cannot enter the United States; and when the dried egg industry was first promoted in the Far East, at the advice of German firms, all plants were equipped with trays and drums for drying purposes made of zinc as this is practically the only metal which does not impart a color to the dried product. In the process, however, of drying the eggs, the ammonia used tended to eat the zinc pans in spots, and in removing the dried product by scrapers a portion of the metal came with it. The new method of drying eggs was then introduced by means of "spraying" or blowing the egg in fine spray into a heated chamber. The resulting product is free from metal and the various egg plants which are largely in the hands of Chinese are gradually converting their establishments into spray plants, the initial cost of installation amounting to about $15,000.

There are only two Chinese-owned egg factories in Tientsin—the Yung Chi Tan Ch'ang at Pei K'ai and the Ta Hsin Tan Ch'ang at Ho Pei. These factories use both methods and turn out a very good product. The most important Chinese-owned factories are located in the interior—Paotingfu, Shihchiachuang and Honan province.

Asbestos

THE TIEN CHING SHIH MIEN KUNG SUS (Tientsin Asbestos Joint Stock Company, Ltd.) was established in 1915 in the British concession. The factory—a group of Chinese houses converted into workshops—cannot be said to be as imposing as the name would lead one to suppose. No foreign machinery is used, mill-boards, etc., being made by large hand presses, and the various yarns and ropes being woven by hand power weaving machines locally constructed from Japanese models. Besides various products used by factories, the concern turns out pillows stuffed with asbestos waste—a type of pillow very popular with the Chinese. A very good mineral is imported from Kwangtung in small quantities, but the greater part used comes from beyond the pass via Peking and from Manchuria. The product, hand-made as it is, compares favorably with the foreign machine-made varieties, is cheaper in price, and is used by various railway shops and factories throughout China. Workmen employed number 70-80. Of these a great number are apprentices with food and lodging furnished and wages of $1 per month. The other workmen are furnished with lodging and command wages of from $3-$6 per month. The hours of work are 11 per day.

Furniture

There are numerous establishments in the foreign concessions ranging from small carpenter shops to large factories with from 50 to 60 workmen. These specialize particularly in foreign style furniture and are able to duplicate very cleverly anything given them; none of them have machinery, all work being done by apprentices and carpenters.

Bricks

There are no Chinese concerns making bricks and tiles by modern methods but there are a number which make these products by the old Chinese methods.

Soap

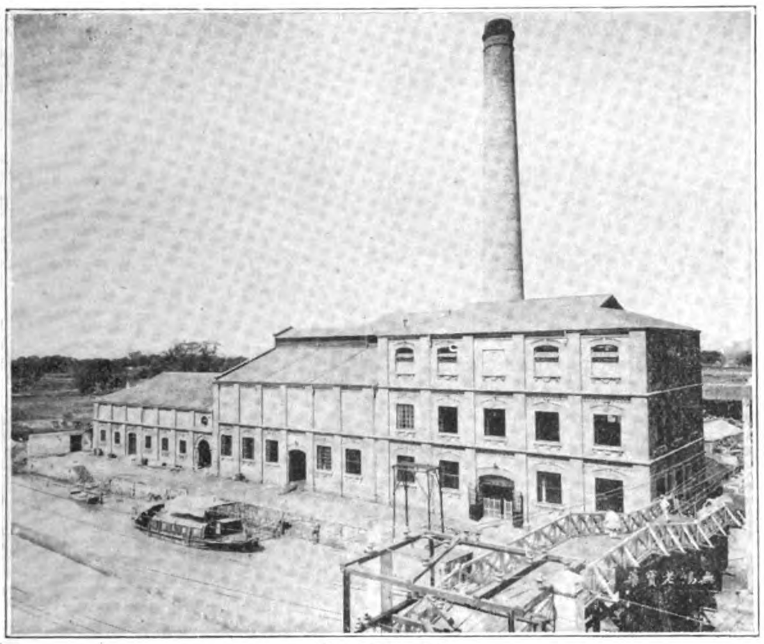
HO CHI TSAO I KUNG SSU, T'UNG HSING TSAO I KUNG SSU, SHUN I TSAO I KUNG SSU and T'IEN CHING TSAO I KUNG SSU.—There are several native style soap-making establishments in Tientsin among which the largest are the Ho Chi Tsao I Kung Ssu at Hsi T'ou, the T'ung Hsing Tsao I Kung Ssu at Hopei, and the Shun I Tsao I Kung Ssu also at Ho Pei. These factories use practically no machinery. The raw material is boiled and alkali added until it is saponified and then it is cooled and cut into strips and bars by hand. The only Chinese-owned factory using foreign machinery is the T'ien Ching Tsao I Kung Ssu located at Ho Pei. This factory was established in 1903 and made soap by the old methods. Foreign machinery from America was installed in 1913, products were exhibited at the Panama exhibition, and since 1915 a foreigner, a soap expert from Holland, has been employed only to supervise the scientific side and of soap making. When the factory is running at full capacity both the foreign and native vats are used. The foreign tank in which the soap is boiled by steam has a capacity of 15,000 pounds, and a new tank is being installed with a capacity of 30,000 pounds. It is also planned to extract glycerine. The factory at present is held up by lack of perfumes which in the past have been purchased in Japan, but which in future on account of the boycott are to be obtained direct from Europe and America. Both washing and scented toilet soaps are made, all of very good quality. Water for the plant is brought from the river and filtered on the premises. The product finds its entire market in Tientsin and North China. The factory running full capacity (when it turns out about 3,000 pounds per day) employs from 80 to 100 workmen. The average working day is 12 hours. Housing and food are provided on the premises. Ap-

(Continued on page 619)

A Model Power Plant

An Allis-Chalmers' Installation at Wusih

ONE of the most up-to-date central electric power plants recently erected in China, is located on the Grand Canal outside the west water gate at Wusih, the growing industrial centre in Kiangsu province on the line of the Shanghai-Nanking Railway. The plant is owned jointly by a group of industrial enterprises controlled by Mr. T. K. Kung and supplies light and power for the Shen Hsin Cotton Mill No. 3, the Mow Sing Flour Mills Nos. 1 and 2 and to a new 500 loom weaving mill now under construction.

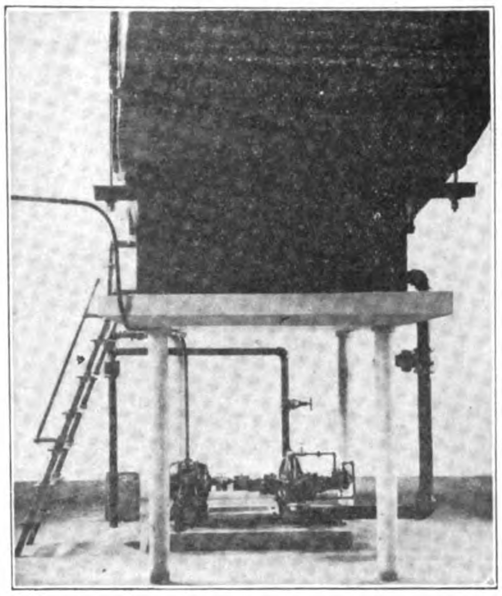


Power House

The plant was started in January of this year, under the management of Mr. Doo Ah-sing, who is also chief engineer. The contractors were the American Trading Company who supplied Allis-Chalmers generating equipment, while the boilers were supplied by Jardine, Matheson & Company. The plant was designed and erected by Mr. G. C. Brown of the Allis-Chalmers engineering staff.

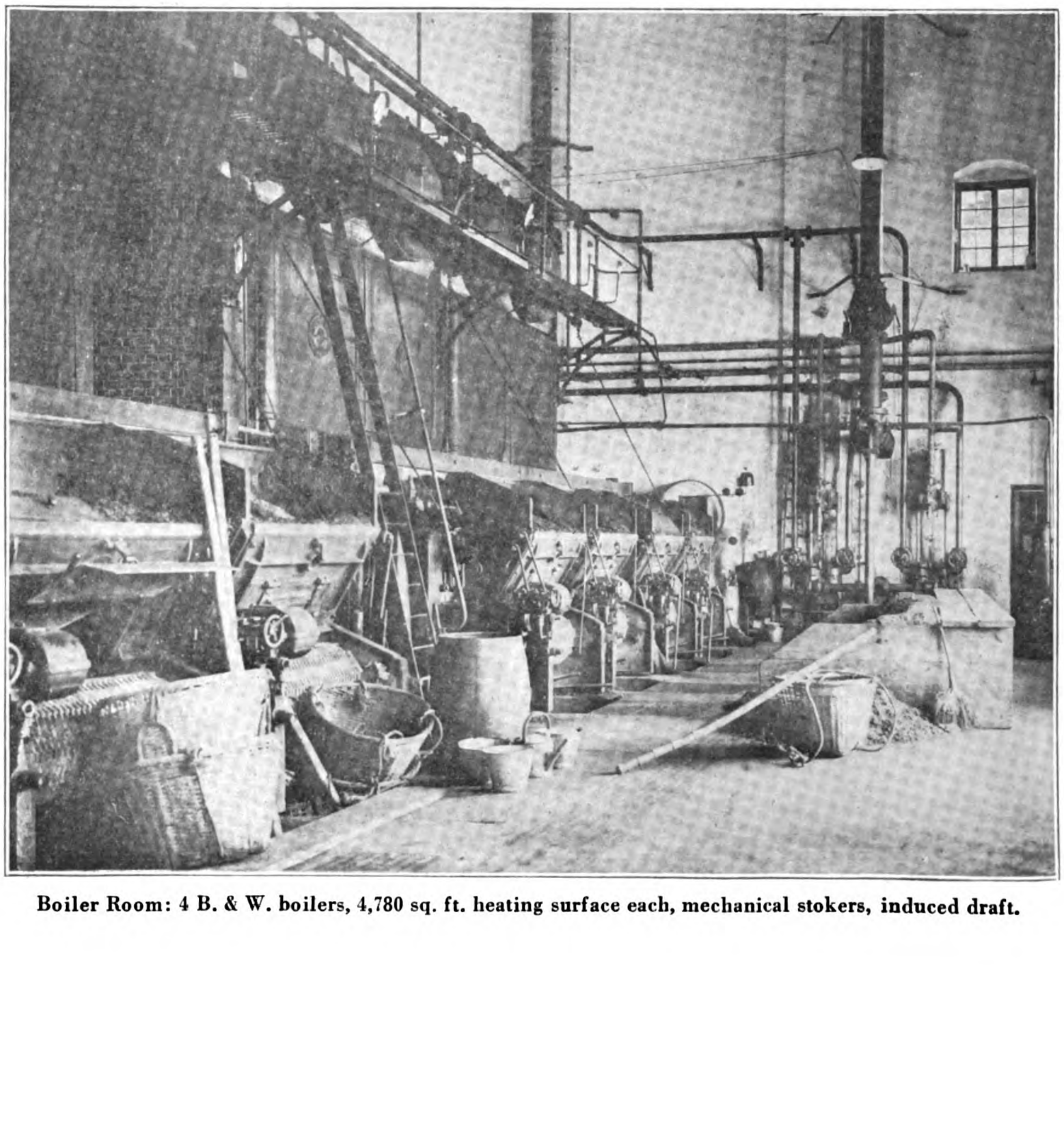
The steam generating plant consists of four Babcock & Wilcox water-tube boilers of 4,780 sq. ft. heating surfaçe each equipped with mechanical stokers, using coal fuel with induced draft. The chimney is 185-ft. by 6-ft. There are two Weir vertical boiler feed pumps and two 1,500 h.p. Cochrane open type feed water heaters from the Harrison Safety Boiler Works, in which all the exhaust steam from the steam-driven auxialiaries and air pumps is utilized.

The power units consist of two Allis-Chalmers steam turbo-alternators with direct connected exciters, operating under a steam pressure of 200-lbs., superheated 200°, generators 2,000 k.v.a., 50 cycle, 2,300 volts, 3,000 r.p.m., power factor, 80. Low-tension voltage for lamps, 220 volts and for power 350 : three phase, three wire system. The turbines are of the Parsons type operating under a vacuum of 28 inch. The turbine room is equipped with a ten-ton traveling crane operated by hand. Each generator is equipped with an air washer capable of washing 10,000 cubic feet of air per minute, the washing medium being water, insuring a constant supply of air free of dust and practically at a constant humidity.



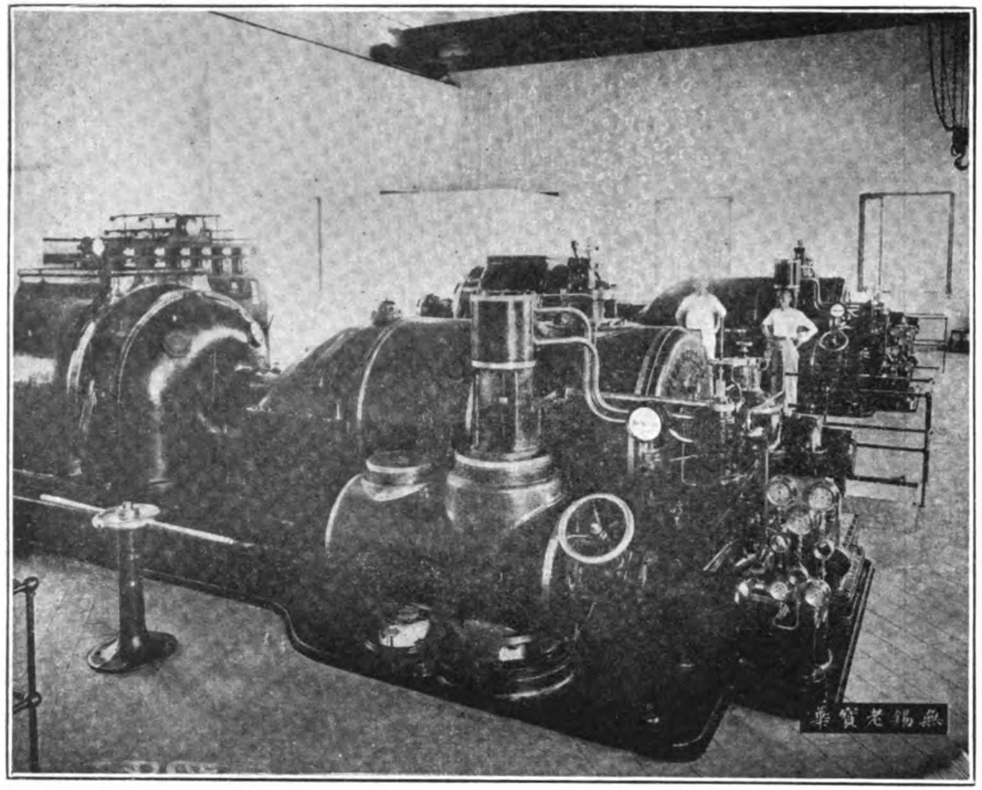
Air Washer

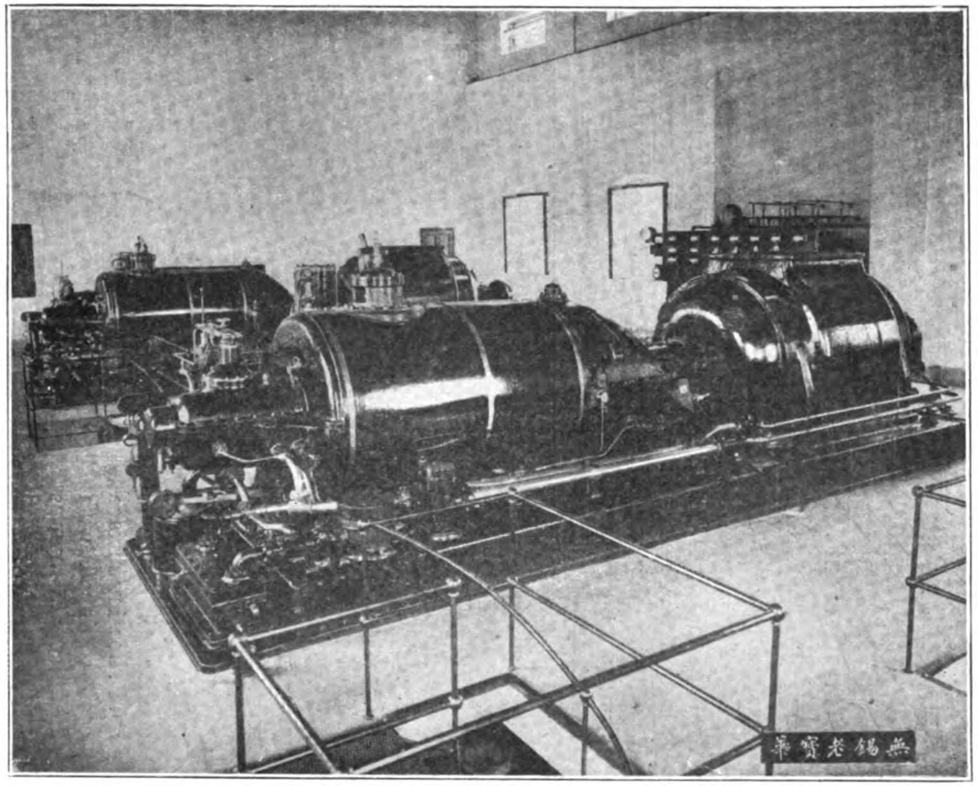
There are two C. H. Wheeler surface condensers of 2,500 sq. ft. heating surface each equipped with Radojet air pumps and circulating and condensing pumps. The circulating pump is driven by a 50 h.p.



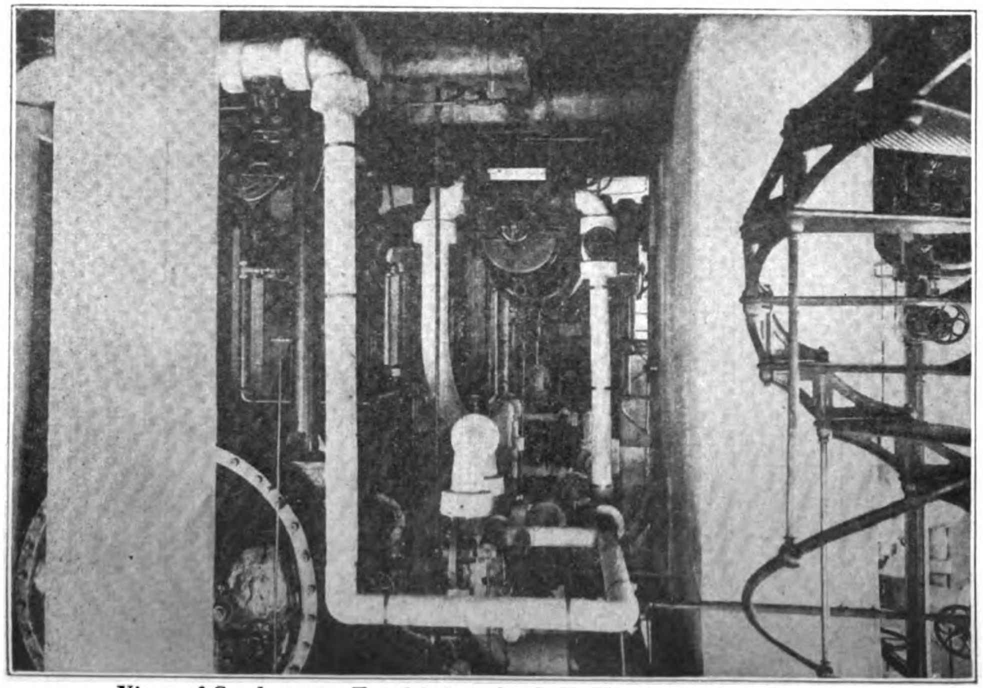
Boiler Room: 4 B. & W. boilers, 4,780 sq. ft. heating surface each, mechanical stokers, induced draft.

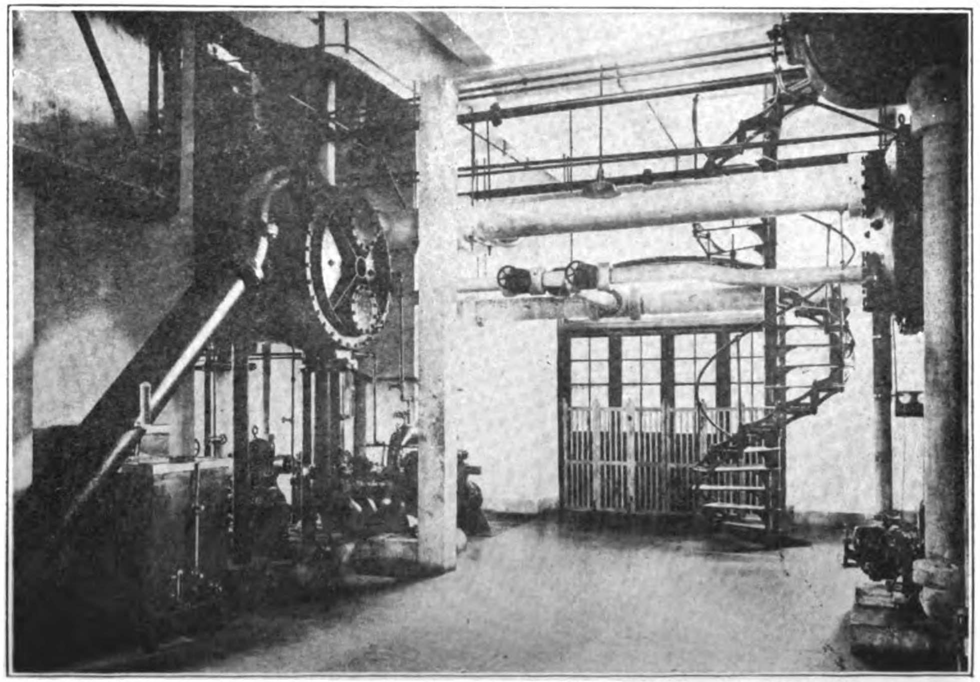
AN ALLIS-CHALMERS' INSTALLATION AT WUSIH





Two Views of Generating Room : Two 2,000 k.v.a. 3 phase, 50 cycle, 2,300 volts Allis-Chalmers Turbo-Alternators, 3,000 r.m.p. Power Factor 80





Views of Condensers : Two 2,900 sq. ft., C. H. Wheeler Surface Condensers : one Condensing Pump driven by 50 h.p. Terry Steam Turbine, the other by 50 h.p. Electric Motor

Terry steam turbine. The condensing pumps are installed in duplicate, one driven by a 5 h.p. Terry turbine and the other by a 5 h.p. electric motor.

The switchboard consists of a seven black slate panels. The first two for the generators one for each machine, the third for the house service through which is derived current at 350 volts from three 50 k.v.a. transformers in the condenser room for operating the motor-driven auxialiaries. The remaining four are the feeder panels for the substations at the mills. Allis-Chalmers transformers and switchboards are in use at the substations. The transmission line is carried overhead on concrete and wooded poles. A private telephone system with a capacity of 30 instruments was installed for communication between the chief engineer's office in the central plant and the several substations.

There is also one 500 gallon, 100-lbs. pressure, 3 stage centrifugal pump driven by an Allis-Chalmers steam turbine and one 500 gallon, 100-lbs. pressure single-phase centrifugal pump driven by an Allis-Chalmers motor, used to provide a supply of cold water through the house service line from which is taken all cold water for boiler make up, oil cooling water and centrifugal pump gland sealing water. When the power plant is operating at full capacity, 8,000,000 gallons of water per day of 24 hours are taken from the Grand Canal. A concrete intake was specially designed and is provided with a double set of stationary screens. These screens are removable by means of an overhead A-frame rigging. The condenser water discharges into a small canal on the opposite side of the power house from the Grand Canal.

TIENTSIN'S NATIVE INDUSTRIES

(Continued from page 616)

prentices—boys—receive a wage of about $30 per year. Wages of the other workmen average $6 to $15 and more per month depending on skill and kind of work. The factory impresses one as being very profitably and efficiently managed.

Ironware, Machinery

Pei Yang Ch'uan Yeh T'ieh Kung Ssu and Pei Yang Ch'uan Yeh T'ieh Kung Ssu; established in 1906 with a capital of Tls. 200,000. The iron comes from Hankow; the factory produces railroad materials, machinery and tools; 600 workmen are employed; the plant is British.

Ssu En Chi T'ieh Kung Ch'ang, established at Tung Ma Lu, Native City, in 1907. Besides these there are a number of native foundries.

Greater Osaka Water Supply

A PLAN is afoot says the *Osaka Marnichi* for constructing an aqueduct to draw water from Lake Biwa to supply Greater Osaka in years to come. Should the plan materialise, it is expected that the volume of water supplied to Osaka will be 350 percent, of its present volume. Osaka then will be able to supply water to outlying towns and villages, should they so desire.

At present, the capacity of the reservoir at Kunijima is estimated at 2,200,000 koku per day. Osaka had anticipated that there would be enough water supplied to the city by the present system up to 1931. At the rate of the highest record of supply during the summer, this year, the full capacity is likely to be reached in 1926 or 7.

To Examine Water

The city has requested the Shiga Prefecture Meteorological Observatory to investigate facts about the water of Lake Biwa and its relation to meteorological conditions, while the examination of the quality of the water has been entrusted to Dr. Kwamura of Kyoto University. Experiments of filtering and sterilizing water are being made by Dr. Fujiwara of the city.

According to the new fourth period plan of waterworks maintenance, the full capacity of filtering will be 90 koku per second, that is an average of 7,770,000 koku per day. By means of machines, water can be filtered to the extent of from 400 to 1,000 cubic feet per day.

When that plan is completed, not only Greater Osaka, but also many outlying districts can be supplied with water. Already inquiries have been addressed to Kobe, Nishinomiya, Amagasaki, Takatsuki, Suita. Ibaragi and other cities or towns or villages, to ascertain if they desire water supply.

Even to-day, 18 towns and villages comprising a total population of 382,100 receive water from Osaka city. There are two towns or viliages, with 18,000 people, where waterworks are being constructed to get the supply from Osaka's system. Thirty four other towns and villages, with 155,000 people, have applied for water.

To Discuss Water Supply

The national conference of the municipal authorities regarding the water supply is to be held in the municipal assembly building of Nagoya for a week from October 2, and three officials concerned in addition to the head of the Osaka municipal sanitary investigation office have been appointed to attend. It is learned that in addition to all the cities in Japan proper, those of Manchuria, Chosen, and Taiwan are to participate in the conference. Many questions in connection with experiences, experiments, and investigations in the matter of municipal water supply will be tendered to the conference for discussion with a view to the improvement of supply systems.

Announcement by American Chamber of Commerce of China

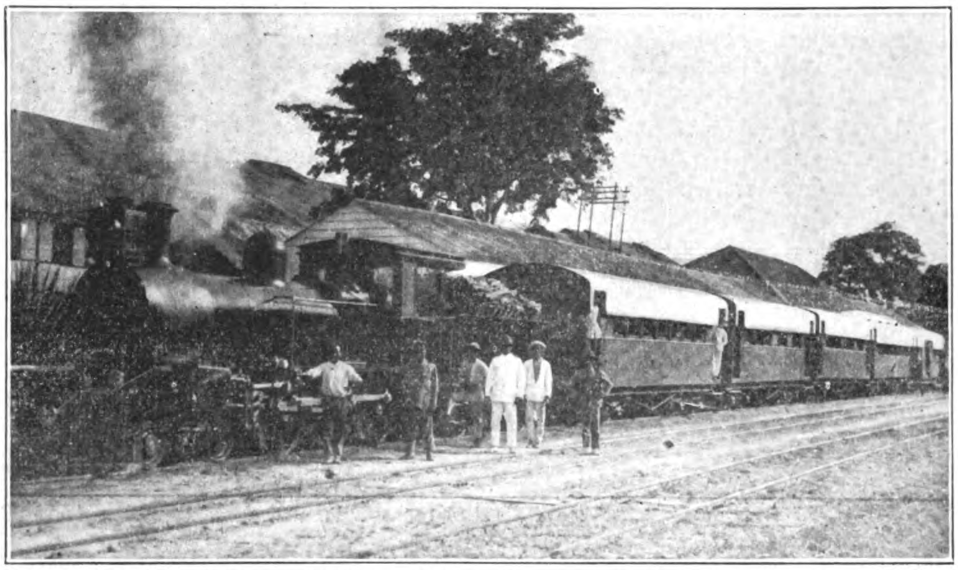
From time to time, stocks in American oil companies are offered on the local markets of China. Full information as to the possibilities of all oil regions and fields in America can be secured without cost by addressing a letter of inquiry to the United States Geological Survey, Washington, D.C., a branch of the American government which has made a close survey of all possible oil fields in the United States and has on file complete data regarding same. When practical, a prospectus of the company marketing the stock should accompany the letter.

North Borneo—A Chinese Colony

By G. C. Irving

EVERYDAY we have reason to realize how little is known about the island of Borneo. Though the British North Borneo Company acquired its rights over its territory forty years ago and has succeeded in reducing the chaos of native rule to a condition of peace and safety, the country still remains but little known. It enjoys a reputation, even at so little a distance as Hongkong and Singapore of being unhealthy, unproductive and beneath the notice of the European capitalist. Actually it is a country with a moderate tropical climate and a generous rainfall capable of maintaining a large population.

More especially and to an eminent degree does this land of plenty provide an ideal existence for the people of China. They have lived and prospered for many years under the government of the chartered company and the only fault we have to find is that sufficient importance has not been attached to the policy of increasing the number of our Chinese colonists. The connection of the Chinese with Borneo dates back to the middle ages. It is a disputed point as to whether the Chinese ever settled in any numbers for there is little reliable evidence of their having done so, but they traded extensively around the coasts of the island and were on friendly terms with the sultans and chiefs.

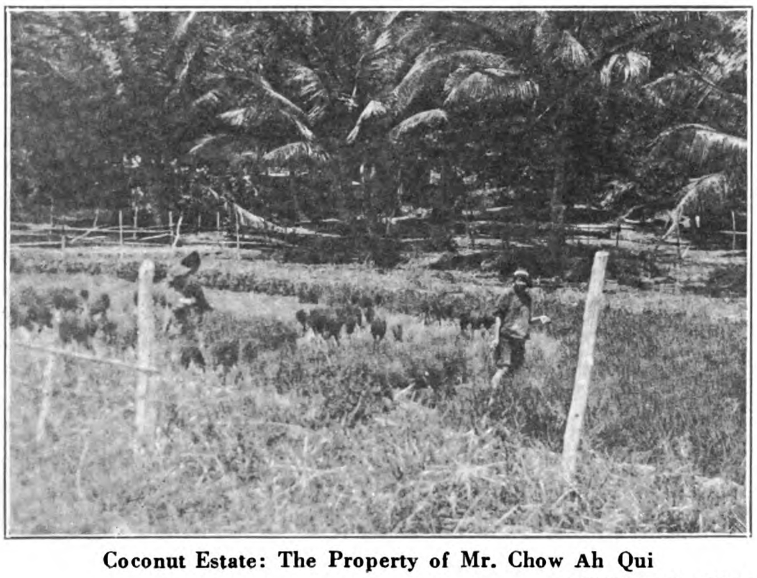


North Borneo Railway: Mail and Passenger Train at Jesselton

When in 1882 the northern part of Borneo passed by treaty into the possession of the chartered company, what trade there was soon came into the hands of the Chinese who settled in Kudat and Sandakan. When the country became safe for the development of large estates, particularly tobacco and coffee, the managers relied entirely upon China for their supply of labor. Medical science was not then what it is to-day with the result that the Chinese contracted fever and other diseases which carried them off in large numbers. No one seemed to worry very much over a high death rate among these unfortunates. The supply of labor was more than equal to the demand and regular supplies of new material were continually coming down from Hongkong. The coolies were placed under a stiff indenture, badly paid and allowed to feed themselves as they liked. Beri beri, the worst scourage of the country, stalked unchecked among the estates and was regarded as incurable and unpreventable.

We do things differently in these enlightened days. Managers regard their labor as their best asset, none but the physically fit are accepted and, once included in the estate labor force, are fed and housed in such a way that the present day sick rate is far below the old death rate. The old indenture has been done away with and what amounted then to a debt bondage no longer exists.

The class that has been steadily coming into the country and is by far the most valuable from an economic point of view is the settler. Recruited principally from southern China and from among the Hakka people, they succeed in making a living within a few weeks of their arrival. The suburbs of all our principal towns and stations have been turned into flourishing gardens. In certain districts the Chinese have mixed with the native population, taken up land that the natives do not want and, to some extent, have married native wives. The settlers provide the towns with fruit, vegetables, poultry and pigs and many of them have acquired



Coconut Estate: The Property of Mr. Chow Ah Qui

Draining new clearing, near Jesselton

(All Photos by Mann Singh, Jesselton)

quite considerable areas of land which they have planted with rubber or coconuts. They are without exception the most desirable class of people that any country could wish to possess. It is therefore not unnaturally that the government encourage their immigration in every way possible, offer them tempting terms for taking up land and subject them to a very light taxation.

The conditions under which Chinese may come to Borneo to-day are the provision of free passages for themselves and their families and a grant of land up to five acres with purely nominal rent for the first six years. As the North Borneo government is not possessed of great wealth the number of free passages is restricted but every encouragement is given to others who can afford to pay their own expenses for the voyage from China.

Hakka Fruit Seller

The immigrant can take his choice as to how he intends to use the land given to him. He may, as many do, set up as a market gardener, breeding pigs and poultry as well. He may prefer, if his land is suitable, to plant coconuts which, in seven years, will assure him a permanent and handsome return for his outlay, or he may try his land at rice, pine-apples, bananas, ground nuts, sugar, coffee, pepper, gambier or rubber. The last is, like coconuts, a question of waiting for several years but all other forms of cultivation give him a return within a short time and all find a ready market.

In the Rice Fields

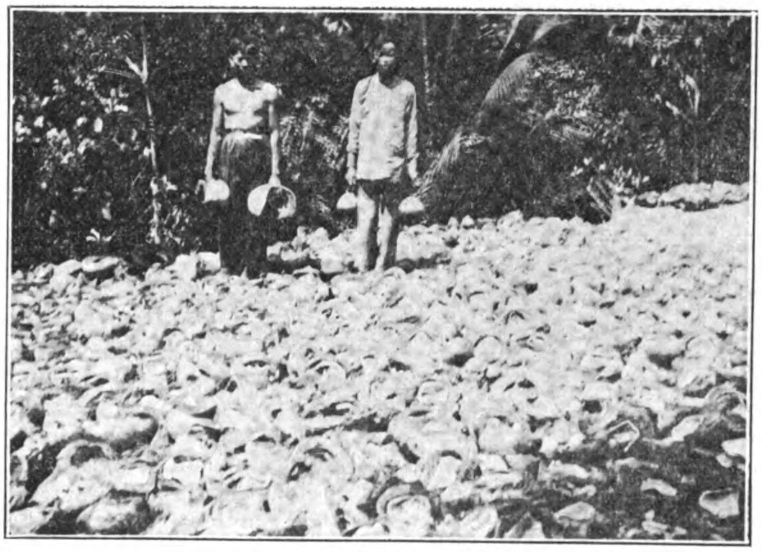
He will find himself unharassed by grasping officials, free to work out his salvation in his own way and to follow the customs of his country and religion without interference. Various missions and societies provide schools for the children of the settlers whose sons as often as not forsake the gardens to become clerks in government offices or business firms.

The successful settler often puts his profits into a small shop and progresses by easy stages from being a penniless coolie to swaggering with the best of them as a full-blown Towkay.

We are beginning to find that the Chinese who become wealthy do not, as was the habit in former days, take themselves and their profits back to China. They prefer to invest it in the country and seem perfectly contented to live out their lives in the land of their adoption.

Even without further immigration their numbers are increasing rapidly. Infant mortality is low and there are ample facilities for medical treatment at most of the settlements. We firmly believe that if the conditions under which Chinese can and do live in Borneo were better known and understood by the southern Chinese we should have to organize a special department to deal with the question of immigration. As it is there seems to be a lot of hesitation on their part before they can make up their minds to abandon their own country. The best means of getting them down that we have found has been to allow established settlers to return to China at our expense and bring down their relations. In this way a steady but limited immigration has been established. The government have more than once tried to organize systematic emigration from China but on each occasion the system has broken down, generally owing to the business being mismanaged in China. Government immigrants arrived burdened with a debt for their expenses from China and for the cost of building their houses. A man who sets out to make good with such a millstone round his neck is seldom if ever a success. Wisely the government has now decided to pay the expenses themselves and to see the return on their money come from the development that settlers bring about. Done in this way, with a hand on the brake to check the influx of undesirables and weaklings, we shall in time reap a rich harvest by seeing our population increase and with it our trade and revenue.

There are in North Borneo immense tracks of country which are practically uninhabited. The country being mountainous practically any form of cultivation up to an altitude of 4,000 to 6,000 feet can be undertaken with success. There is land more than sufficient to plant rice in quantities which would make the country self-supporting as regards its principal food. From the terminus of government railway for instance a road is under construction to connect the plains of Keningau with the coast. On these plains which stretch for over 20 miles there are but a few scattered villages of Muruts, a native tribe who cultivate nothing beyond the land immediately around their villages. The plains are traversed by several rivers which will make a system of irrigation inexpensive to initiate and covering thousands of acres of good land. A Chinese colony established in this valley would prove a flourishing concern within a very short time. Similar areas equally suitable for rice are to be found throughout the country but the government naturally hope to develop the land beyond the rail-head to provide freights and passengers for their railway which has so far been a burden on the revenues of the country.



Copra

In additions to the railway and road extension from the port of Jesselton towards Keningau, a road 22 miles long has been built and is now in course of being metalled which will throw open other large tracts of land on the west coast. From Sandakan, the capital and principal trading port on the east coast, road construction has been completed for a distance of fifteen miles penetrating forest country which will become first-class agricultural land when the timber has been felled. These few places which have been specially mentioned would absorb quite 20,000 settlers and still leave the greater part of 30,000 square miles to be developed. As the present resources of the country are not sufficient to finance anything approaching 20,000 immigrants the populating of the country by Chinese must for the present remain more or less a dream.

Much, however, can and should be done by judicious propaganda among the people of south China to induce them to emigrate on their own initiative and found new homes in this rich land. With our small population poverty is practically unknown. A small proportion of the Chinese laboring class do become from sickness or disinclination to work a burden upon the state but the proportion is so small as to be almost negligible men of the artisan and laboring classes find good employment at wages which keep them in comfort. The artisan can command as much as $2 per day and laborers from 40 cents to 80 cents. The cost of living depends, for the Chinese, principally upon the cost of rice which is now about 50 per cent. above pre-war prices and other requirements are by no means costly as taxation is directed more against luxuries than against the necessities of the less wealthy class. The native of the country is entirely self-supporting except for his clothing which he buys from the Chinese traders.

It is to be understood that Borneo is no fever-stricken, pest-haunted tropical swamp but a country capable of maintaining a dense population and of producing much that the outside world can make use of.

The chartered company has successfully carried out its mission of subordinating the indigenous races to civilized rule, it has to a certain extent developed its property but to an extent which is only the beginning of what can and should be done in the future. Its revenues to-day are not sufficient to enable the government to carry out ambitious schemes of development. Its coast is deficient in lights, its harbor backward in facilities for loading steamers and its road system in its infancy. What can be done on the revenues has been done but those who criticise the administration for its backwardness forget that bricks cannot be made without straw. Our greatest want, population, exists in millions in China, we shall do her no harm and ourselves much good if we can successfully indure her access population to try their luck in a new country.

Dutch Activities in China

FOR years past the Hollanders have almost entirely neglected their chances in China and looked passively on whilst Belgians, Britishers, French, Japanese and Germans made a profitable business out of the construction of railways, and supplying the necessary rails, bridges and rolling stock. Dutch activities have been confined to the harbor works at Shanghai and Chefoo, writes the "Gazette do Hollande," but how much more might have been accomplished! It has chiefly been the Belgians who have applied themselves energetically to obtaining command of the Chinese market. Their efforts have considerably benefited the industry of Belgium, which has for years been supplying all kinds of materials to a value of tens of millions of francs per annum. By means of an extremely practical mode of co-operation between Belgian industry and the banks, the Banque Belge pour l'Etranger in China is doing excellent business.

It has now become possible for Dutch business men to participate in one of the large concerns based on the said co-operation. The Dutch syndicate for China has obtained a share in the construction of the Lung-Hai Railway, which will connect Lanchow, the capital of the province of Kansu, with Haichow, on the China sea. On May 1, 1920, and agreement was signed between the said Dutch syndicate, the Chinese government and the Belgian Compagnie Générale de Chemins de Fer et de Tramways en Chine, according to which Dutch engineers will construct the railway from Hsü-chow-fu to Haichow (about 240 kilometres), as well as the ocean harbor at the latter place. These great harbor works will be constructed by contractors to be appointed by the Dutch syndicate for China, whilst the material for railway construction will preferably be supplied by Dutch industry. To finance the undertaking, the syndicate will place a loan of fl. 50,-000,000 in Chinese treasury notes on the market. The payment of interest and the redemption of these treasury notes has been guaranteed by the Chinese government and by a special mortgage on the railway, whilst the engineer-in-chief will have absolute control over the expenditure and receipts of the line. This is, therefore, not a state loan in the ordinary sense of the word but an issue of specially guaranteed treasury notes upon security capable of itself producing the means of paying both interest and redemption.

On this solid basis, Holland has begun to take part in the promising economic development of China, says a writer in the "Nieuwe Rotterdemsche Courant." The harbor plans for Haichow have been studied by the Dutch experts and our railway engineers have begun work, and already reached the Great Chinese canal.

It is, therefore, not a little disappointing that the issue of the first part of the treasury loan was not a success on the Amsterdam market. Doubtless, this was partly due to the rumors of civil war in China last spring. Far from shaking confidence, however, the fact that this war did not in the least injure the prospects of the works ought to be reassuring, inasmuch as it has proved that such concerns, involving foreign interests, are respected, even in times of civil disturbances.

Nothing is better calculated to demonstrate the value of old Chinese culture than the fact that civil war or any other political event which in western countries would bring business life absolutely to a standstill, has no power to ruffle the calm of the Chinese people, who perform their daily tasks unperturbed. If one further reflects that China numbers 400,000,000 inhabitants and that its foreign trade as yet represents only fl. 9 per head (as against fl. 1,090 in Holland), it is clear that there are enormous possibilities for trade, industry and shipping in that country with its industrious, intelligent and peaceable population.

Chinese Cement Factory Proposed

PLANS are under consideration for the construction of a small cement plant in the vicinity of Kaying city, which is about 150 miles inland from Swatow, on a branch of the Han river, says the U.S. Commerce Reports. The necessary materials are reported to be found in abundance in this district, and it is intended to test out the possibilities of this business by establishing a small plant, which, if circumstances justify, will subsequently be enlarged.

Descriptive matter and proposals are desired for the cement-making machinery required for a complete plant. Proposals should be addressed to Ching Wen-san, care of Messrs. Tek Hua Seng, Chaochowfu, via Swatow, China. Communications in English can be understood, but correspondence with Mr. Ching Wen-san must be in Chinese. Transactions of this character should be handled through representatives in China, who presumably would be located in Swatow, Canton, or Hongkong, although possibly Shanghai representatives could reach this district.

Radio in China

MR. E. T. LOCKWOOD, writing in the *Radio News*, deals extensively with Radio matters in China. The following is extracted from his article :—

The Chinese government has a few spark stations of moderate power, most of which carry on commercial business. They are efficient stations as far as they go, but at present the government radio facilities are very inadequate. They do not have in operation a single station capable of transmitting regularly over a thousand miles, although many are in contemplation.

The best stations in China are those that the Japanese government has established. There are several powerful stations at strategic points in China. The Japanese are constructing a large station near Peking for the Chinese government at the present time.

The Federal Telegraph Company of America has contracted with the Chinese government for the rection of several high power radio stations, notably one at Shanghai, to be one of the largest in the world. This will be of great value to commercial interests in China because of the irregularity of the cable.

Peking-Tientsin Radiophone

Because of the difficulty of maintaining the regular (or irregular) long distance wire telephone, the China Electric Company, in co-operation with the Chinese government, has put in operation two stations to be used in lieu of the land line between Peking and Tientsin. Speech travels from house telephone in one city, via land wire, then radio, and then land wire again to the house telephone in the other city, a distance of over 70 miles. Both stations are easily heard in Shanghai, a distance of 650 miles. This is the largest service of its kind in the world, and it's in China !

Chinese writing is hieroglyphic and so the Chinese have had to compile a code book of characters corresponding numbers. Thus each character is designated by a number in telegraphic communication. The standard Chinese dictionary contains something like 40,000 characters, but the ordinary number used does not exceed 5,000.

The French have established a system of stations throughout China and Indo-China. They deserve much credit for the way in which they have for years rendered weather forecast service and time signals. The time signal is of the letter type not beating off seconds, and is accurate to within a few seconds. The signals are relayed from the French observatory in Shanghai to the local station FFZ.

Japanese QRM

Much has been said about Japanese interference, intentional and otherwise. The main difficulty seems to be that the transmitters are directly coupled, of course, producing high decrement and a broad wave. The main difficulty with the Japanese themselves seems to be that they have an ingrained liking for repetition, which, with their cumbersome and lengthy alphabet, makes the whole Japanese navy a nuisance to amateur, as well as to professionals, Naval ships of various countries are allowed to use full power in the port Shanghai.

Like most governments the Chinese government intends to be strict with regard to radio regulations. Private radio stations on Chinese territory are frowned at by the authorities and in many instances, they have had to be dismantled, causing the foreign consuls much inconvenience. However, Shanghai is an international settlement, the government being carried on by a municipal council, elected by the people of all nations, exclusive of Chinese. Under these conditions the Chinese government has not attempted to exercise radio jurisdiction as to wave-lengths, power, etc. The amateurs of Shanghai, for the most part, would welcome legislation on the part of the Chinese government, providing the rules were not too strict, for it would give the amateurs their own realm. The Chinese government seems to be too busy running more important affairs and has not had time to enforce regulations on amateur wireless.

Not Much Amateur Transmitting

As a matter of fact, however, since there are no amateurs to send to outside of Shanghai, there has been very little transmitting on the part of amateurs. At present, the few who have powerful transmitters use pretty much whatever they please, as did the one mentioned in the beginning of this article.

Although the writer is informed that there are at present over 100 amateurs in Shanghai, they have never organized a club, but it is anticipated that such an organization will be formed in the near future. Such a radio club would be an innovation in the way of nationalities represented in that it would include Americans, British, French, Dutch, Portuguese, Chinese and possibly several others. It might be able to do a great deal toward putting amateur radio in China on a firm basis.

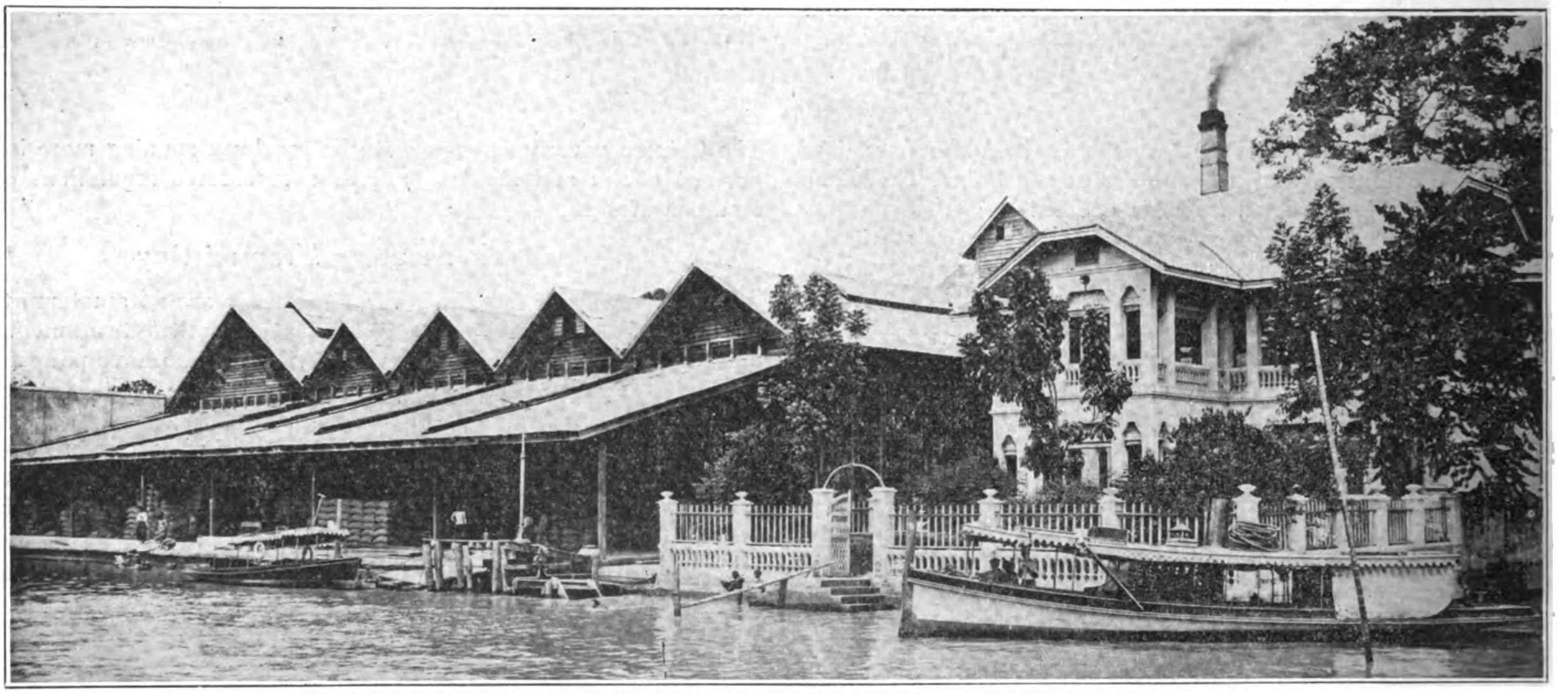
From Coast to Coast

Because of its central location, Shanghai is an admirable place from which to cover the world by radio. It is a convenient thing to remember that London and Paris, Shanghai and Manila, and San Francisco are equi-distant points around the world. Euroopean stations come in strong here, both large and small. Pacific coast American stations also come in well. Even atlantic coast stations have been heard in Shanghai. It is a coincidence, and many of you may have heard. Pearl harbor and Nauen sending time signals at the same time, one at noon and the other at midnight. Their wave lengths are such that they both can be heard at one adjustment. The air in Shanghai is practically free from static in winter, but in hot weather it is likely to be very heavy.

A short time ago the writer was astonished to hear perfectly good Peking Chinese language floating around the ether. "The whole world do move !" He was interested to read in a recent number of *Radio News* that Chinese was " just a gurgle." If it is in life a gurgle, over a wireless phone it's a strangling performance.

Nanyang college, at Shanghai, one of the leading Chinese technical schools of the country, has instituted a course in radio engineering. They have been fortunate enough to secure the services of Mr. T. C. Chang, an American-trained radio engineer, who, as head of the department, is rendering great service to radio in China. At present there are about 20 students taking up this line. It is a full-fledged engineering course, not merely a school for operators.

One of the most interesting radio enterprises in China has been the popular educational movement under the direction of Prof. C. H. Robertson of the lecture department of the Y. M. C. A. He purchased, while in America a short time ago, the two complete radio telephone stations which were used in the victory way in New York city during the victory loan drive. These he has cleverly mounted in trunks, so that in a few minutes' time, the two stations can be set up for lecture purposes. On one tour of about 12 cities, 100,000 people heard him speak. To see some old Chinese governor with the phones clamped to his ears, as interested as a kid, is a sight to make one think that China has got to wake up. He has given lectures to the leading generals of the country and even before the president of the republic himself. It would not be surprising if China was one of the first countries in the world to establish a satisfactory commercial network of wireless telephones, because land lines have never been installed. Because of the great distances to be covered and the difficulty of procuring land even to plant telephone poles, the wireless telephone may solve one of the greatest communicational difficulties between China's 1,900 walled cities.



A Typical Bangkok Rice Mill: The Hu Long Heng Chan Rice Mill

Siam's Rice Mills

IN normal years, milled rice forms at least 80 per cent. of all exports from Siam. However, since 1919 the rice market has not been in a normal state, and although the rice shortage of 1919-20 forced the price of rice to an average of Tcs. 16.61 per picul for a total of Tcs. 123,083,000, the output in piculs was 7,409,453 against an average yearly output of 18,000,000. Restriction of export, which was ordered in November, 1919, was not removed until January 1921, and the export of rice for the year ending March 31, 1921, was only 4,660,487 piculs.

The Siamese are essentially an agricultural people, and have devoted 5,959,200 acres, chiefly on the alluvial plains of central Siam, to the cultivation of rice. With few exceptions the paddy is milled in Bangkok, the milling industry being exclusively in the hands of the Chinese. European firms formerly operated rice mills, but were unable to compete successfully with the Chinese. With the seizure of German property in 1917, the last European rice mill went out of existence.

There are 75 steam rice mills in Bangkok, and 4 electric mills. The high value of the tical and the low value of the rupee gave Burmese rice a distinct advantage on the early 1922 market, and 17 Bangkok mills have temporarily closed awaiting a more favorable exchange or an increased demand for rice.

The Chinese millers deal directly with the Hongkong and Sinapore markets, but sell through European firms for the Java and European markets. Occasionally markets in the West Indies and Japan are generally supplied by non-Chinese firms.

PADDY FROM VARIOUS PLACES LANDED AT BANGKOK RICE MILLS INCLUDING RICE MILLS AT PAKLAT AND SAMSEN

(1 kwien = 16 piculs)

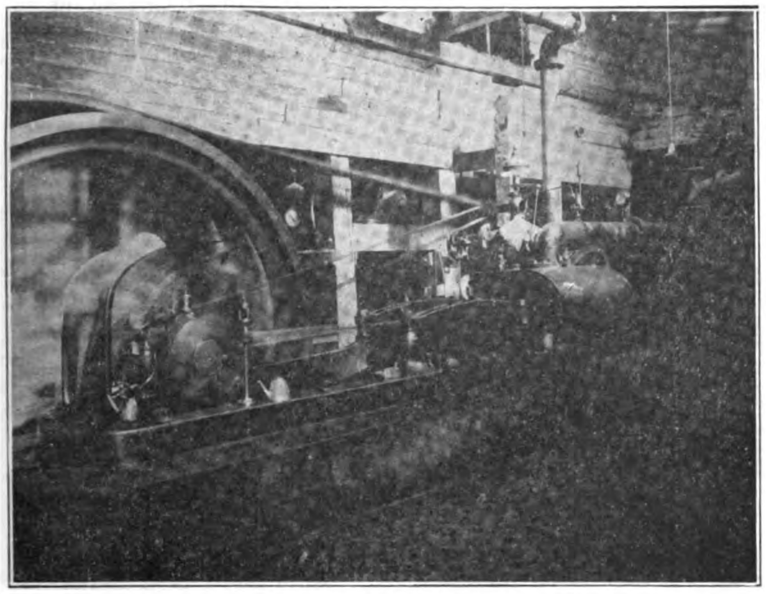
1922 Month	By Boats Kwiens	Paddy landed at Mills By Rails N. Line Kwiens	S. Line Kwiens	Total Kwiens
January	7,418.92	9,340.95	60.00	83,590.87
February	78,569.42	13,200.08	105.30	91,874.80
March	77,752.57	10,250.92	1,131.47	89,134.96
April	72,269.98	12,761.97	1,523.23	86,555.18
May	45,195.28	8,185.77	1,633.60	55,014.65
June	47,356.47	10,025.55	1,634.50	59,016.52
July	55,677.20	5,822.77	1,352.60	62,852.57

(Figures supplied by the department of Statistics, Royal Siamese government, Bangkok).

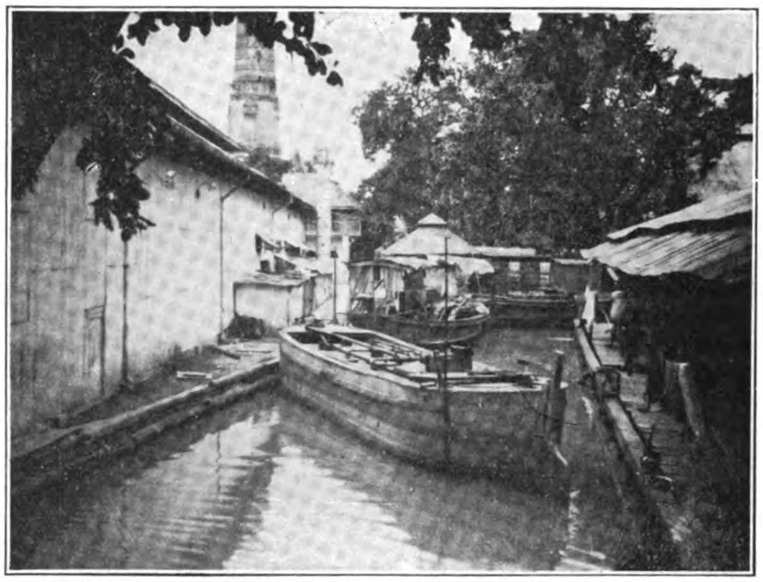
Rice Mills Situated at Bangkok

Mill and Location:

Hoa Heng Seng W. Bank, Menam (Paklat)
Kim Thye Seng, W. Bank, Menam (Paklat)
Kwang Huat Lee, W. Bank, Menam (Paklat)
Eiah Lee, W. Bank (Ratboonak)
Hong Long Huat, W. Bank (Bangpakok)
Nam Heng Lee, W. Bank (Bangpakok)
Chin Seng, W. Bank (Bangpakok)
Kwang Guan Lee, W. Bank (Bangpakok)
Kwang Mong Seng, W. Bank (Bangpakok)
Lim Heng Chang, W. Bank (Bangpakok)
Siang Heng Long, W. Bank (Klong Daokanong)
Chai Soon Kee, W. Bank (Klong Daokanong). Closed
Ngee Seng Huat, W. Bank (Klong Daokanong)
Kwang Hap Seng, W. Bank (Klong Daokanong)
Teck Lee, W. Bank (Klong Daokanong)
Kwang Hong Chiang, W. Bank (Klong Daokanong)
Long Heng Lee, W. Bank (Klong Daokanong)
Siang Kee Chan, W. Bank (Klong Daokanong)
Guan Hoa Seng and Guan Hong Seng, W. Bank (Klong Daokanong). Closed
Liang Huat Lee, W. Bank (Klong Daokanong)
Hoa Heng Chieng, W. Bank (Klong Daokanong). Closed
Li Tit Guan, W. Bank (Klong Daokanong)
Kwang Joo Seng, W. Bank (Klong Daokanong). Closed
Kwang Long Seng, W. Bank (Klong Daokanong)
Guan Cheng Seng, W. Bank (Klong Daokanong)
Fook Lee (Samrei), W. Bank (Klong Daokanong)
Poh Thye Heng, W. Bank (Klong Bang Luang)
Yong Hing Chan, W. Bank (Klong Bang Luang)
Guan Hong Thye, W. Bank (Klong Bang Luang)
Guan Thye, W. Bank (Klong Bang Luang)
Siang Heng Chang, W. Bank (Klong Bang Luang). Closed
Kwang Hoa Lee, W. Bank (Klong Bang Luang). Closed
Nam Seng Chieng, W. Bank (Klong Bang Luang)
Poh Thye Seng, W. Bank (Klong Bang Luang)
Long Heng Chan, W. Bank (Klong Bang Luang)
Yong Thye Hah, W. Bank (Klong Bang Luang)



Long Heng Chan Rice Mill, Engine Room



Fuel for the Boiler Plant of the Siam Electricity Works in Bangkok consists of Rice Paddy Husks, brought from the Mills by Boats to the Power House

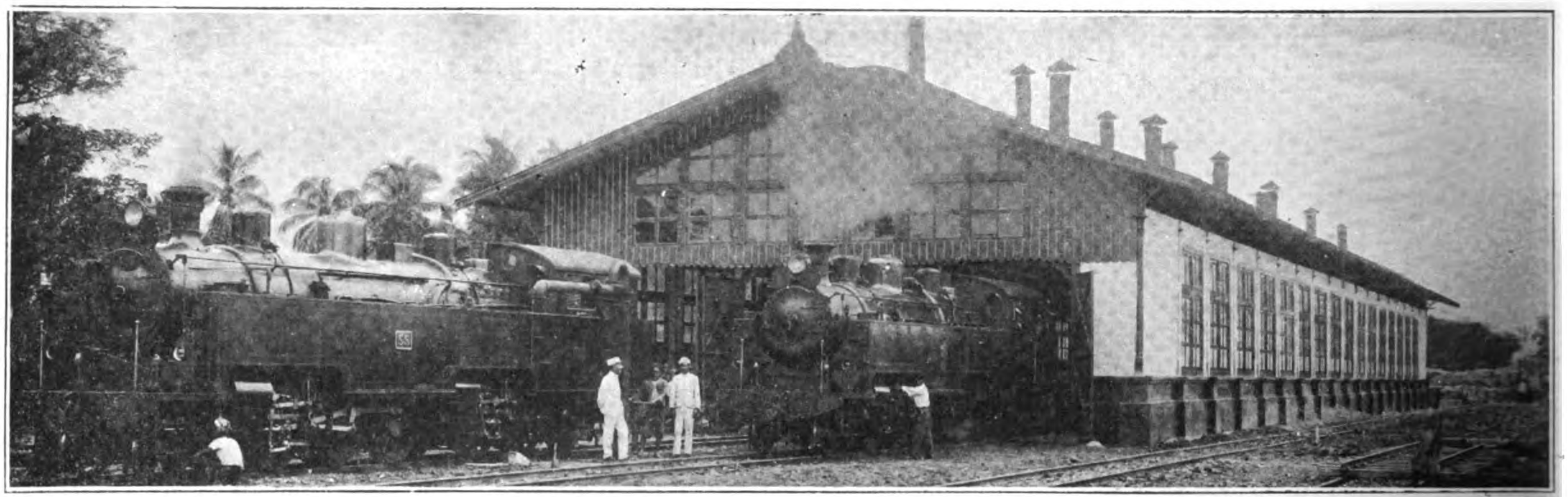
Yong Hong, W. Bank (Klong Bang Luang)
Hoa Heng Chan, W. Bank (Klong Bang Luang)
Thye Heng Lee, W. Bank (Klong Bangkok Noi)
Hoa Heng Lee, W. Bank (Bang Bua Thong)
Liang Huat Lee, East Bank Menam (Klong Prakanong)
Meng Heng Seng, East Bank Menam (Klong Prakanong)
Siang Hong Long, East Bank Menam (Klong Prakanong)
Kwang Long Chieng, East Bank Menam (Klong Prakanong)
Khean Heng Lee, East Bank Menam (Klong Prakanong)
Kwang Heng Seng, East Bank, Menam (Klong Prakanong)
Nam Long, East Bank Menam (Klong Prakanong)
Lim Heng Chan, East Bank Menam (Klong Prakanong)
Guan Lee Chan, East Bank Menam (Klong Prakanong)
Meng Teck Seng, East Bank Menam (Klong Prakanong). Closed
Meng Guang Seng, East Bank Menam (Klong Prakanong)
Kwang Hong Thye, East Bank Menam (Klong Prakanong). Closed
Khoon Chom, E. Bank (Klong Poh Yome)
Long Heng Seng, E. Bank (Klong Poh Yome)
Fook Wah Sen Kee, E. Bank (Bangrak)
Soon Seng Heng (Bangrak), Electric Mill
Guan Heng Lee (Bangrak), Electric Mill
Buan Lee Huat, E. Bank (Klong Kut Mai), Electric Mill
Hoo Hong, E Bank (Klong Kut Mai), Electric Mill
Kiam Lee Heng, E. Bank (Klong Kut Mai), Electric Mill
Heng Hong, E. Bank (Klong Kut Mai), Electric Mill
Lo Jin Hong, E. Bank (Klong Kut Mai), Electric Mill. Closed
Kim Seng Guan, E. Bank (Klong Kut Mai), Electric Mill. Closed
Seng Nam Heng, E. Bank (Klong Kut Mai), Electric Mill
Hoa Hong, E. Bank (Klong Kut Mai)
Eam Mong Chan, E. Bank (Klong Kut Mai). Closed
Mean Heng Chan, E. Bank (Klong Kut Mai)
Soon Hoa Seng, E. Bank (Klong Hoa Lampong). Closed
Sang Hak Heng, E. Bank (Klong Hoa Lampong)
Seng Heng Lee, E. Bank (Klong Hoa Lampong). Closed
Jin Hoa, E. Bank (Klong Hoa Lampong), Electric Mill
Kim Hoa Long, E. Bank (Samsen). Closed
Hong Choon Huat, E. Bank (Samsen). Closed
Sieng Hong Long, E. Bank (Samsen)
Khean Lee Chan, E. Bank (Samsen)
Joo Huat Seng, E. Bank (Samsen). Closed
Guan Tit Lee, E. Bank (Samsen)
Kim Guan Seng, E. Bank (Bangpo)

Siam Mills Elsewhere than in Bangkok

Kim Hoa Chua, Patriew
Kim Hoa Seng, Patriew
Kim Seng Lee, Korat
Ching Ying Soon, Pak Penang, Sritamarat Province
Who Hong, Pak Penang, Sritamarat Province
Kuang Nam Heng, Pak Penang, Sritamarat Province
Ea Lee, Pak Penang, Sritamarat Province
Ho Soon Hin, Pak Penang, Sritamarat Province

Chinese Engineering Agency Formed

FOR the first time in the history of China, a group of foreign-educated Chinese have established a "General Engineering and Consulting agency" in Peking. The principal objects of the agency are to facilitate the Chinese and foreigners secure exact, concise and correct information on the various technical subjects in this country in the shortest possible time and at the least expense; to investigate and offer advice on engineering undertaking to be started or already in operation with reference to sources of raw materials, transportation facilities, labor costs, etc.; to recommend technical men to suitable positions; to furnish proposals, plans, specifications, drawings, agreements and estimates on new engineering projects; to render correct and concise technical translation from Chinese subjects to English or French or *vice versâ* and to supply confidential trade reports at intervals to firms or individuals, who may thus be kept in intimate touch with the pulse of the demand of the day. Similar service will be rendered to Chinese clients. Mr. Chung, who is in charge of the agency, says that his office sells service only and does not propose to act as agent or to sell any goods for any manufacturer, though consulting engineers, they may recommend to prospective buyers certain products suitable for the Chinese markets.



German Locomotives used on the Java State Railways. All the engines in Java are of German or Dutch manufacture with the exception of a dozen locomotives from the American Locomotive Company used on the mountain lines between Krawan and Padalarang

N.E.I. State Railways and Tramways

Report for year ending 31st December, 1921

SUBMITTED to the members of the colonial council (volksraad) and the Dutch parliament as a basis for the budget of 1923 by the board of managers of the state railways.

1st Part. General Data

1. RAILROADS AND TRAMWAYS

A. Open Mileage

Number of *kilometres* being worked at the end of 1920: in Java gauge 1,007 metres, 2,510: of which 64 kilometres are double track; 3.6 km. triple track; 5.3 km. quadruple, and the remainder, single track.

Gauge 0.600 metres, single track, 120; opened for traffic in 1921, single track gauge 1.067 m., 127; total number of kilometres at the end of 1921, gauge 1.067 metres, 2,637; gauge 0.700 m., 120.

In Sumatra (gauge 1.067 metres) the number of kilometres at the end of 1920 was 488; gauge 0.750 m., 511; opened for traffic in 1921, gauge 1.067 metres, 44: total kilometres at the end of 1921: gauge 1.067 metres, 532; gauge 750 m., 511.

Total number of kilometres in Netherlands India, worked by the state:

1.067 metres gauge, 3,169; 0.750 m. gauge, 511; 0.600 m. gauge, 120: total, 3.800 (2,125 miles).

B. Working Results (in florins)

	1919	1920	1921
Total capital expenditure to lines being worked, inclusive rolling stock and further equipment	343,201,164	369,489,938	411,446,853
Total earnings	56,543,471	68,875,918	78,557,184
Gross working expenditure inclusive of renewals, depreciation, relaying and strengthening	39,001,162	61,149,229	68,758,482
Net Profits	17,542,309	7,699,689	9,798,702
Revenue by passengers	22,435,503	29,565,128	33,315,287
,, ,, goods	27,655,148	31,058,448	36,002,124
Ratio of expenditure to earnings	69%	88.7%	87.5%

* 2. ROAD MOTOR SERVICES

		Kilometres
In the province	Palembang (Sumatra)	763
,,	Benkoelen (Sumatra)	567
,,	West coast of Sumatra and Tapanoelie (Sumatra)	930
,,	Cheribon (Java)	101
,,	Preanger Regentschappen (Java)	88

B. Working Results (in florins)

	1919	1920	1921
Balance of capital account at 31st December	1,155,915	1,558,213	1,478,257
Total earnings	1,558,797	2,076,739	1,848,831
Gross working expenditure	1,265,688	2,002,174	2,193,898
Net profits	293,109	74,565	345,067 (loss)
Revenue by passengers	940,623	1,262,382	1,134,310
,, ,, goods	572,211	754,698	680,451

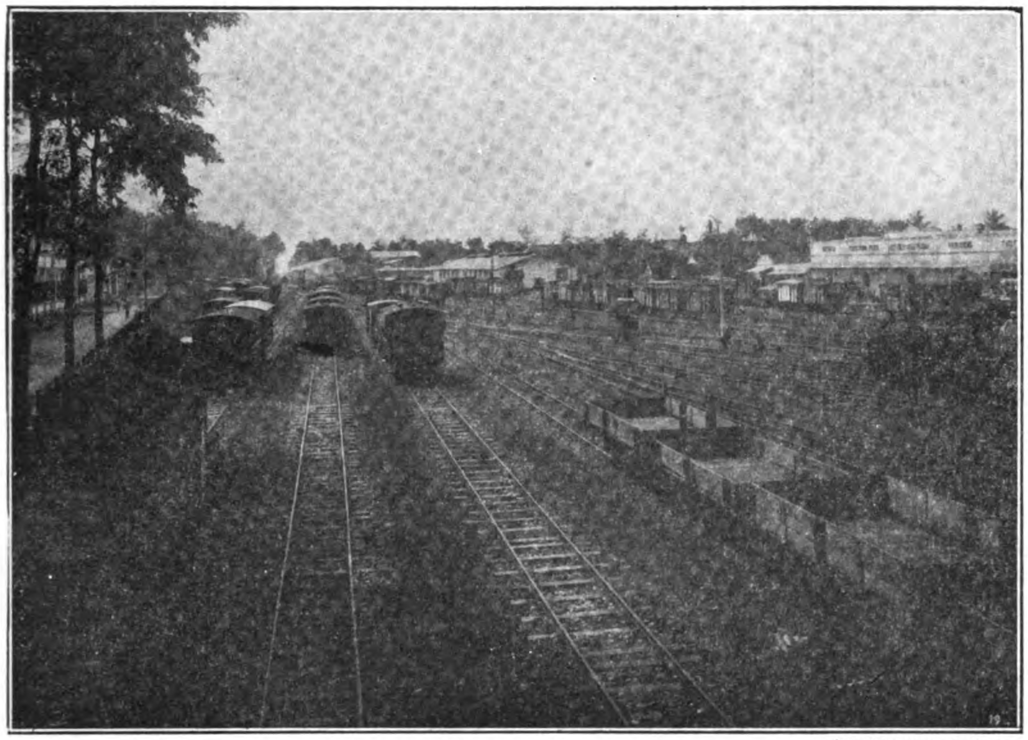
Compared with 1919 there was a considerable increase of working costs in 1920, mainly due to necessary cost of living allowances to the whole staff and higher rates of pay to laborers. In 1921 the increase was due to advances in expenditure on the heads maintenance of way and works, inclusive of strengthening of bridges, Fl. 780,000; running expenses owing to increased consumption of fuel and oil, Fl. 3,400,000; traffic expenses owing to increased traffic and the employment of additional staff consequent upon the new regulation of periods of duty (service, labor and resting time), Fl. 1,800,000.

Consequent upon these important increases of the working expenses a committee was appointed to consider and report upon the possibility of decreasing the working expenditure. The investigation had no immediate important result. A slower introduction of the new regulation on service, labor and resting time, reorganization of the stores department and of the management of the workshops were some of the measures proposed by the committee.

* The detailed report on the Road Motor Service was published in the Motor Section of The Far Eastern Review, September, 1922.

Besides it was not deemed advisable to advance rates and fares, in view of the unfavorable conditions abroad of which the influence is felt by trade and agriculture in Netherlands India.

It is impossible to predict how long the universal uneasiness in trade and agriculture will last and it is therefore very necessary to follow an utmost prudent financial policy.



Freight Yard of the Java State Railways at Bandoeng (Kurkdjian, Sourabaja)

Accordingly it has been investigated how far in the near future the increase of the capital expenditure can be limited without prejudicing the earnings. This was found possible by postponing the construction of some works and delaying a part of the extension program. Consequently, the total amount of the working scheme for 1921 could be brought 3 millions of florins beneath the authorized budget figure and for 1922, 17 millions less.

2nd Part

RAILROADS AND TRAMWAYS

Part 1. In Java

Stores.—Replenishing of the stock has been temporarily stopped and orders in Europe and in the colony were cancelled in so far as it was possible. Only indispensable purchases were made to assure a regular service.

Double Tracks.—April 1st the Krawang-Tjikampek line was double tracked a distance of 21 kilometres, was opened to traffic and the section Meester Cornelis to Bekassi, a distance of 15 kilometres, is nearly completed. As soon as the new bridges over the Tji (river) Taroem and Bekassi river are received and erected, the double tracking of sections Kedoenggedeh to Krawang (6 kilometres) and Bekassi to Tamboen (7 kilometres) will be opened for traffic. In East Java the doubling of the Wonokromo-Krian line (21 kilometres) is being continued while work on doubling the section Krian to Modjokerto has been stopped. The survey for doubling the Kroja-Idjoe-Wonosari line (53 kilometres) is in progress and the survey for doubling the sections Manggarai to Buitenzorg (45 kilometres) and Modjokerto to Kertosone (40 kilometres) was started. Plans and estimates for doubling the section Padalarang to Bandoeng (12 kilometres) have been prepared.

Relaying.—The sections Bandjar to Tjipari (28 kilometres) and Bangil to Pasoeroean (16 kilometres) have been relaid with rails of 33.4 kilograms per metre (in England known as 80-lb. rails). A total of 1,200 kilometres has already been relaid.

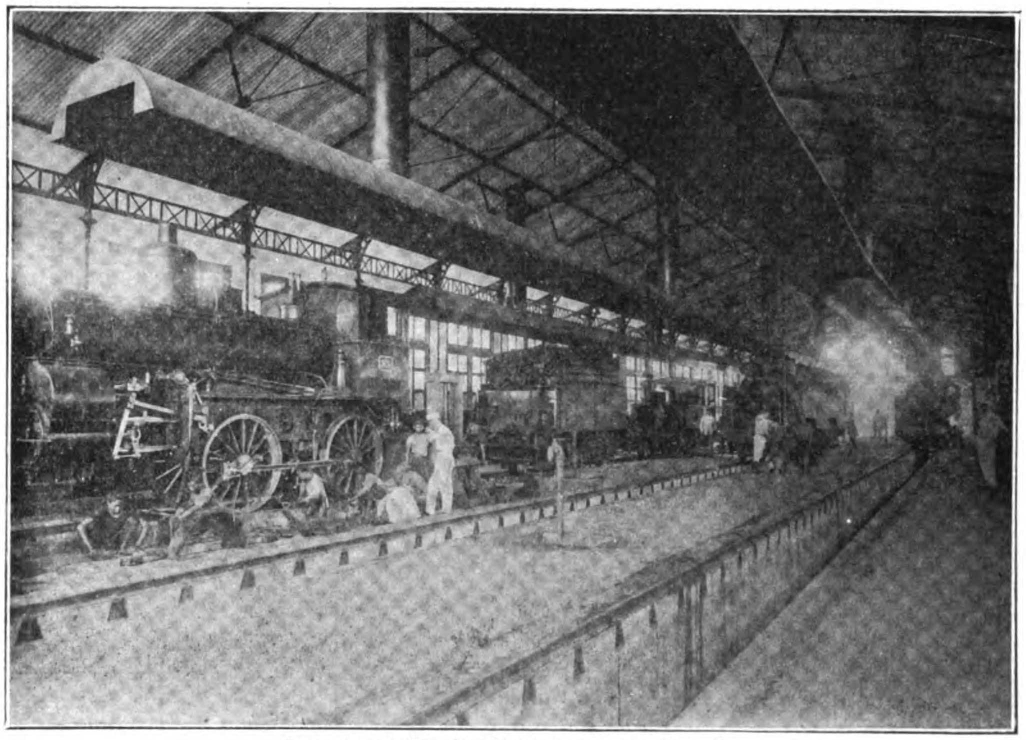
Rolling Stock.—During the year, 81 standard gauge *locomotives* were placed in service with 63 still on order. The number of engines in service on the standard gauge lines in Java on 31st December, 1921, was 578. 78 new coaches for standard gauge and 8 narrow (0.600 metre) gauge coaches were placed in service during the year, all of which were built in the administration's workshops. The wagon stock at 31st December, 1921, was 13,561 standard gauge; 1,873 new goods vehicles, all built in the administration's workshops, were placed in service.

Steamship—Workshops.—To facilitate and accelerate more important repairs, situated at a great distance from the central workshops, small workshops have been erected.

Working Results (of Standard Gauge Railroads and Tramways)

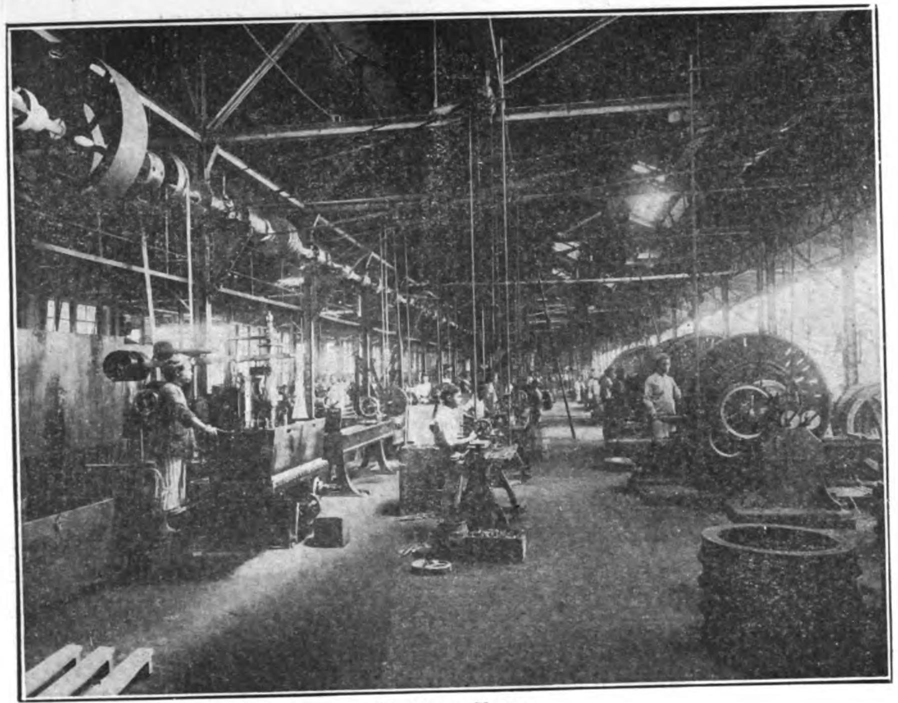
	1921	1920	Increase
	florins	florins	florins
Gross earnings	68,517,244	59,809,798	8,707,448
Gross expenditure	57,795,649	50,773,621	7,022,026
Earnings in excess of Expenditure	10,721,595	9,036,177	1,685,418

Compared with 1920 there was an increase in earnings of 15 per cent. and an increase in expenditure of 14 per cent.

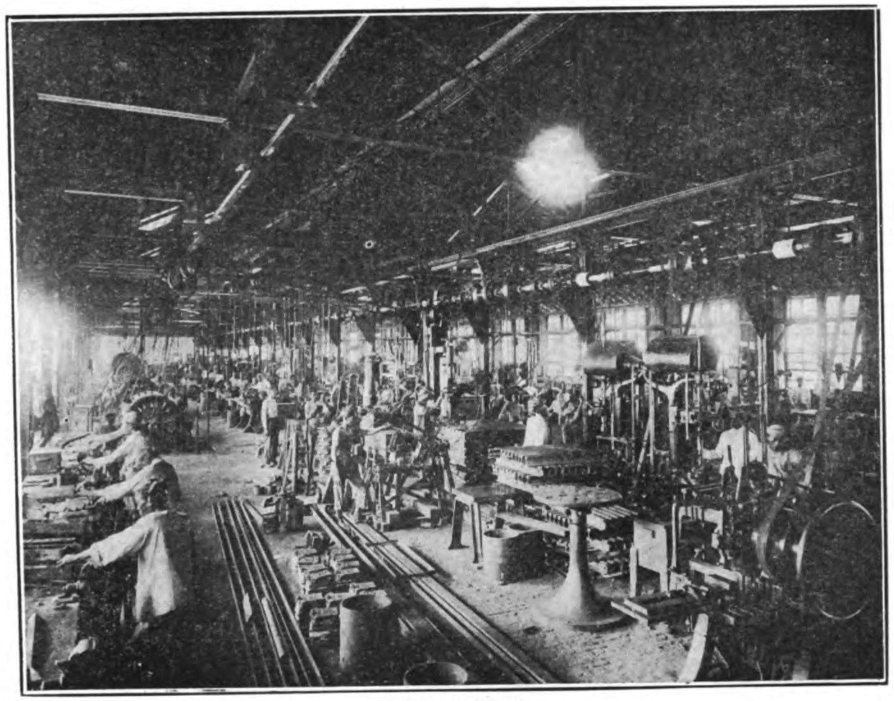


Locomotive Shed at Manggarai, near Batavia

WORKSHOPS OF THE N.E.I. RAILWAYS



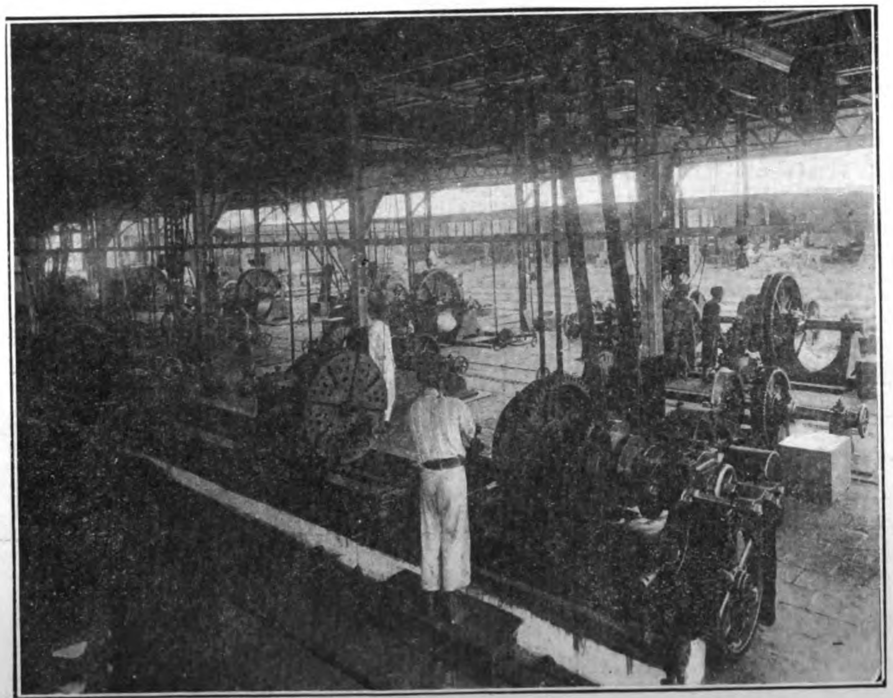
Madioen Shops



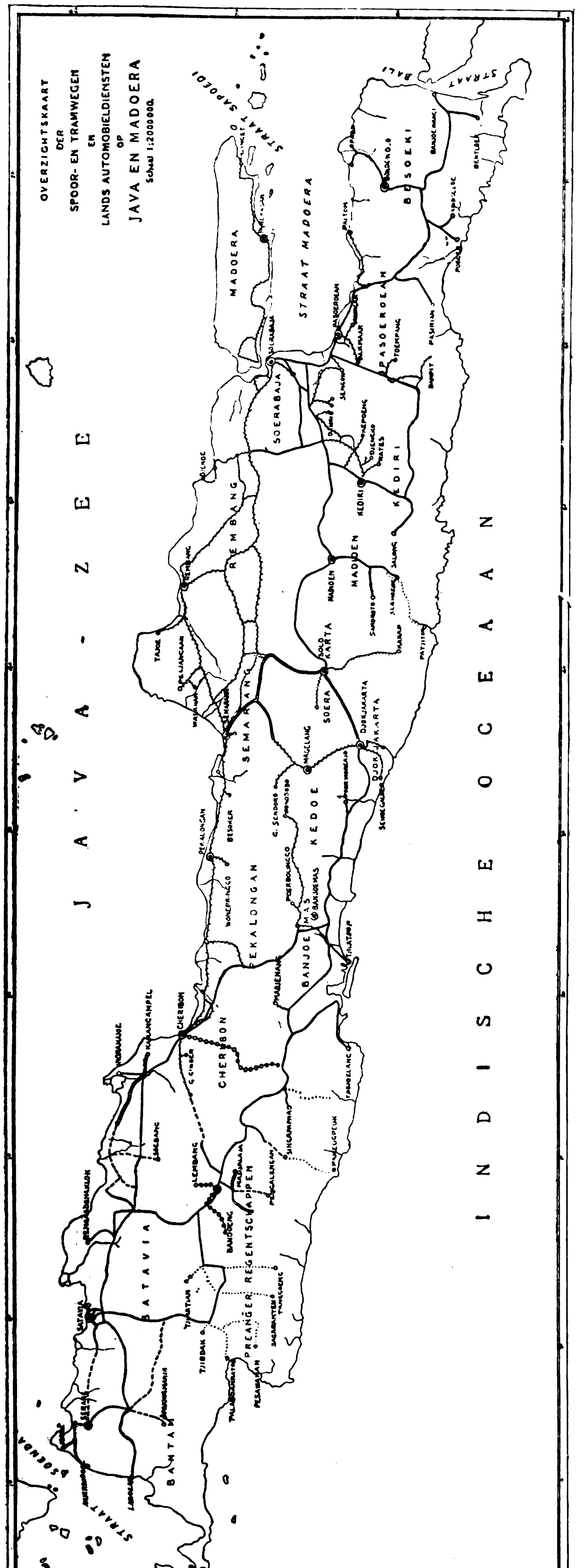
Manioen Shops

Forge Shop at the Madioen Shops

(Photos by Kurkdjian, Sourabaja)



Wheel "hospital" at the Bandoeng Shops



Earnings.—The earnings under the several main heads and the percentage under each head to total earnings were as follows :

	1921	Per cent. of Total Earnings	1920	Per cent. of Total Earnings
	florins		florins	
Passengers	29,843,712	43.5	26,281,145	44
Luggage	679,962	1	586,230	1
Parcels	2,734,372	4	2,124,816	3.4
Goods	30,705,580	45	26,413,280	44
Live stock, corpses and carriages ..	393,329	0.5	375,378	0.6
Other traffic receipts	4,160,289	6	4,028,949	7
Totals	68,517,244	100	59,809,798	100

The total earnings per day kilometre, compared with 1920 were: 1921, fl. 72.62 ; 1920, fl. 65.16. The increase of passenger earnings was 13.55 per cent. and increase of goods earnings was 16.25 per cent.

Expenditure.—The working expenditure inclusive of double tracking, relaying and strengthening but exclusive of renewals and depreciation, was :

1921, fl. 57,795,649 or fl. 61.25 per day kilometre.

1920, fl. 50,773,621 or fl. 55.31 per day kilometre.

showing an excess of fl. 7,022,028 or 13.8 per cent.

The ratio of expenditure to earnings compared with the previous year was : 1921, 84 per cent. ; 1920, 85 per cent. There were increases under all heads, as follows :

	1920	1921	Increase Total	Per cent.
	florins	florins	florins	
General charges ..	5,091,409	6,129,796	1,038,387	20.39
Maintenance of Way and Works ..	6,220,370	6,999,394	779,024	12.53
Maintenance of rollingstock and running expenses ..	25,694,832	29,097,381	3,402,549	13.24
Traffic expenses ..	13,767,010	15,569,078	1,802,068	13.10

Minor or Simple Lines*

Java.—The following new standard gauge tramlines were opened during the year : Bandoeng-Soreang and connection Karees-Kiaratjondong, 25.83 kilometres ; Rantjaekek-Tandjongsari, 11.23 ; Kalipeotjang-Tjidjoelang, 38,807 ; Gempolkerep-Plosso, 19,549 ; Rogodjampi-Srono, 12,390.

Sumatra.—Blambangan-Kotaboemi, 19,796 kilometres ; Garoentang-Telokbetong, 3,935 ; Pajacombo-Limbanang, 20,221.

At the end of the year the following simple lines were open for traffic :—

Java

1. State tramways in the provinces of Sourabaia and Madioen : gauge, 1,067 milimetres : total length, 173 km. ; (*a*) Krian-Plosso, 46 km. : (*b*) Babat-Djombang, 71 km. ; (*c*) Madioen-Ponorogo-Soemoroto with branch line Ponorogo-Baloeng, 56 km.

2. State tramways in the district of Krawang : (1) Gauge, 1,067 mm., total length, 19 km. ; Djatibarang-Indramajoe. (2) Gauge, 600 mm. : total length, 80 km. ; (*a*) Tjikampek-Tjilamaja, 28 km. ; (*b*) Tjikampek-Wadas, 16 km. ; (*c*) Krawang-Rangasdengklok, 21 km. ; (*d*) Lamaran-Wadas, 15 km.

3. State tramway Rambipoedji-Poeger with branch line Baloeng-Amboeloe : Gauge, 600 mm., total length, 41 km.

*In Netherlands India the tramways take up a part of the conveyance of passengers and goods ; they are considered as 3rd class railways and have another character than the town or vicinal tramways abroad. A special division of the railway administration is charged with the management of tramways, the second class railway in Sumatra and the road-motor services. As the working of all these lines, compared with the principal railways, is simple, that division is called "Division of Simple Lines."

4. State tramways near Bandoeng : Gauge, 1.067 mm. ; total length, 38 km. ; (*a*) Rantjaekek-Tandjongsari, 12 km. ; (*b*) Bandoeng-Soreang with connection Karees-Kiaratjondong, 26 km.

5. State tramways in the east part of the province of the Preanger Regencies : Gauge, 1.067 mm. ; total length, 101 km. ; (*a*) Tasikmalaja-Singaparna, 17 km. ; (*b*) Bandjar-Tjidjoelang, 84 km.

6. State tramway Rogodjampi-Srono : Gauge, 1.067 mm. ; total length, 12 km.

SUMATRA

1. State tramway in Atjeh : Gauge, 750 mm. ; total length, 511 km.

2. State tramways in South Sumatra : Gauge, 1.067 mm. ; total length, 267 km. ; (*a*) Palembang Line, Kertapati (Palembang)-Praboemoelih-Moearaenim-Tandjong, 165 km. ; (*b*) Lampong Line, Pandjang-Tandjongkarang-Laboeanratoe-Hadjipemanggilan-Blambangan-Kottaboemi with connection Telokbetong-Garoentang, 102 km.

3. State railway at the west coast of Sumatra : Gauge, 1.067 mm. ; total length, 265 km., of which 50 km. is rack railway and 215 adhesive track.

WORKING RESULTS

The results of the standard (1.067 millimetres) gauge tramways in Java are included in those of the mainline.

I. STATE TRAMWAYS IN THE DISTRICT OF KRAWANG

(Gauge 600 millimetres)

	1921 florins	1920 florins	Increase florins
Gross earnings	392,963	361,729	31,234
„ expenditure	341,960	303,184	38,776
			Decrease
Earnings in excess of Expenditure	51,003	58,545	7,542

Compared with 1920 there was an increase in earnings of 8.6 per cent. and an increase in expenditure of 12.7 per cent.

Per day kilometre the earnings and expenditure were :

	1921 forins	1920 florins
Gross earnings	13.45	12.36
„ expenditure	11.71	10.35

II. STATE TRAMWAY RAMBIPOEDJI-POEGER WITH BRANCH LINE BALONG-AMBOELOE

(Gauge 600 millimetres)

	1921 florins	1920 florins	Increase florins
Gross earnings	274,763	253,439	21,424
„ expenditure	211,690	175,850	35,840
			Decrease
Earnings in excess of expenditure	63,073	77,589	14,516

Compared with 1920 there was an increase in earnings of 8.4 per cent. and an increase in expenditure of 20.4 per cent.

Per day kilometre the earnings and expenditure were :

	1921 florins	1920 florins
Gross earnings	18.36	16.88
„ expenditure	14.15	11.71

III. STATE RAILWAY AT SUMATRA'S WEST COAST

	1921 florins	1920 florins	Increase florins
Gross earnings	5,460,203	5,205,348	254,855
„ expenditure	4,197,667	3,714,016	483,651
			Decrease
Earnings in excess of Expenditure	1,262,536	1,491,332	228,796

Compared with 1920 there was an increase in earnings of 4.8 per cent. and an increase in expenditure of 13 per cent.

Per day kilometre the earnings and expenditure were :

	1921 florins	1920 florins
Gross earnings	58.44	58.05
„ expenditure	44.73	41.42

The ratio of expenditure to earnings compared with the previous year was in : 1921, 76.88 per cent. ; 1920, 71.36 per cent.

Earnings.—The earnings under several mainheads compared with 1920 were as follows :

	1921 florins	1920 florins	Increase Total florins	Increase Per cent.
Passengers and luggage	1,378,684	1,292,777	85,907	6.64
Goods..	3,142,299	3,121,317	20,982	0.77
Other traffic receipts.	939,220	791,254	147,966	18.70

Expenditure.—Comparative figures of expenditure under the following heads are :—

	1921 florins	1920 florins	Increase Total florins	Increase Per cent.
General charges ..	1,076,738	778,375	+298,363	38.33
Maintenance of way and works ..	745,529	575,100	+170,429	29.63
Maintenance of rolling stock and running expenses ..	1,642,088	1,613,457	+ 28,631	1.78
Traffic expenses ..	630,917	669,358	— 38,441	—
Electric power station	102,395	77,726	+ 24,669	31.75

IV. STATE TRAMWAY IN ATJEH

	1921 florins	1920 florins	Increase florins
Gross earnings	1,786,299	1,746,069	40,230
„ expenditure	1,981,709	1,862,065	119,644
Expenditure in excess of Earnings	195,410	115,996	79,414

Compared with 1920 there was an increase in earnings of 2.3 per cent. and an increase in expenditure of 6.24 per cent.

Per day kilometre the earnings and expenditure were :

	1921 florins	1920 florins
Gross earnings	9.57	9.33
„ expenditure	10.62	9.96

The ratio of expenditure to earnings compared with the previous year was : in 1921, 111 per cent. ; in 1920, 106 per cent.

Earnings.—The earnings under several mainheads, compared with 1920, were as follows :

	1921 florins	1920 florins	Increase Total florins	Increase Per cent.
Passengers and luggage	1,057,232	1,053,711	3,521	0.33
Goods..	557,541	524,982	32,559	6.20
Other traffic receipts.	171,526	167,376	4,150	2.50

Expenditure.—Comparative figures of expenditure under the following heads are :—

	1921 florins	1920 florins	Increase Total florins	Increase Per cent.
General charges ..	359,127	347,209	11,918	3.4
Maintenance of way and works.. ..	433,071	403,155	29,916	7.4
Maintenance of rolling stock and running expenses ..	881,408	841,064	40,344	4.8
Traffic expenses ..	308,103	270,636	37,467	13.8

VI. State Tramways in South Sumatra

	1921 florins	1920 florins	Increase florins
Gross earnings	2,125,712	1,499,536	626,176
„ expenditure	1,559,403	1,316,050	243,353
Earnings in excess of Expenditure	566,309	183,486	382,823

Compared with 1920 there was an increase in earnings of 42 per cent. and an increase in expenditure of 18 per cent.

Per day kilometre the earnings and expenditure were :

	1921 florins	1920 florins
Gross earnings	21.97	16.93
„ expenditure	16.12	14.86

The ratio of expenditure to earnings, compared with the previous year was : in 1921, 73.31 per cent. ; in 1920, 87.77 per cent.

Earnings.—The earnings under several main heads, compared with 1920 were as follows :

	1921 florins	1920 florins	Increase Total florins	Increase Per cent.
Passengers and Luggage	588,547	542,787	45,760	8.43
Goods..	1,409,156	833,182	575,974	69.13
Other traffic receipts	128,009	123,567	4,442	3.6

The advance in the revenue of the Palembang line, compared with a previous year, was : in 1921, fl. 578,138 ; 1920, 256,875.

The greater advance is to be contributed to the increase of coal traffic, consequent upon a larger output of the state collieries at Bukit Assam. A comparison of recent years figures of the revenue on coal traffic is as follows : 1919, fl. 346,565 ; 1920, fl. 426,175 ; 1921, fl. 820,230.

The advance in the revenue of the Lampong line compared with a previous year was : in 1921, fl. 73,148 ; 1920, fl. 33,820.

The trade depression consequent upon the fall in price of pepper, rubber, coffee, etc., has disturbed the gradual development of the traffic of this line.

Expenditure.—Comparative figures of expenditure of both lines under the following heads are :—

	1921 florins	1920 florins	Increase Total florins	Increase Per cent.
General charges ..	260,713	282,569	— 21,856	--
Maintenance of way and works ..	373,186	262,857	+109,329	41.58
Maintenance of rolling stock and running expenses ..	728,866	574,521	+154,345	26.90
Traffic expenses ..	145,894	124,801	+ 21,093	16.90
Ferry service :				
Palembang - Kertapati and Road motor service Telokbeton-Tandjongkarang ..	50,744	71,301	— 20,557	—

3rd. Extension and New Works

§ 1. RECONNAISSANCE AND SURVEY

Java

The surveys of the following lines have been completed :—(*a*) Garoet-Tjikandjang, distance 32 km. ; (*b*) Bandjaran-Pengalengan, 21 km. ; (*c*) Kopo-Tjiwidei', 12 km. ; commencement was made with the preparation of the construction : (*d*) Tandjongsari-Soemedang (lengthening of the tramway Rantjaekek-Tandjongsari), distance for adhesive railway : 21 km. and for rack railway : 17¼ km. An examination of a route for electric tractive power has been commenced. (*e*) An aerial ropeway from the Kawapoetih volcano to Tjiwidei, distance, 8 km.

Because of financial reasons, the examination of routes connecting the west part of the provinces of the Preanger Regencies and Bantam and the terminals Tangerang to Serang has been stopped. A survey of a line Soebang-Pegadenbaroe-Pamanoekan, 37, km., was commenced. The municipality of Bandoeng has commenced a study of the tramway problem on the plain of Bandoeng. The working out of a reconnaissance of an extension of the tramway system on the plain of Djember and an investigation into operation of road motor services in the province of Banjoemas is in progress.

Sumatra, Borneo, Celebes, Bali and Lombok

In progress are : (*a*) the survey of the line Lahat to Djambi in South Sumatra ; (*b*) examination of the traffic problem in the province of Benkoelen ; (*c*) a new examination of the tramway problem in the isles of Lombok and Bali ; (*d*) the survey of the line Batangtoroe to Padangsidempoean, distance 28 kilometers. The reconnaissance in the gorge of the Kwantan river has been stopped. The report of the reconnaissance of the railway connection in central Sumatra and the connection between the lines of the west coast with the South Sumatra system and the survey of a line, Sibolga to Batangtoroe, distance 49 kilometres in the province of Tapanoeli is completed. A reconnaissance in the province South and East districts of Borneo, for examination into the possibility of transport of iron ore from the Soengeidoewa district to the coast is being made.

§ 2. CONSTRUCTION

All the following tramways have standard gauge (1,067 millimetres).

1. *Bandjar-Kalipoetjang-Tjidjoelang Tramway* (part of the East Preanger tramway system).—This tramway starts from Bandjar station on the mainline Bandoeng-Djokja and runs in a south easterly direction to Kalipoetjang on the Indian Ocean, a distance of 44 kilometres ; and from Kalipoetjang in a westerly direction to Tjidjoelang, a distance of 39 kilometers. This tramway was opened for traffic as far as Kalipoetjang on 15th December, 1916 and the whole line on 1st June, 1921. The total expenditure amounted to fl. 9,619,162.

2. *Tramway Rogodjampi-Bentjoeloek.*—This tramway, which starts from Rogodjampi station on the mainline Kalisat-Banjoewangi, runs in southerly direction to Bentjoeloek, a distance of 42 kilometres, and was opened for traffic as far as Srono, 13 kilometres from Rogodjampi, on 26th October, 1921. The other portion of the line has not yet been opened for traffic but handed to the open line only. The total expenditure amounts to fl. 895,387.

3. *Tramways near Bandoeng.*—(*a*) Rantjaekek-Tandjongsari-Soemedang. This tramway starts from Rantjaëkèk station on the mainline Bandoeng-Djokja at a distance of 18 kilometres from Bandoeng and runs in a north-easterly direction to Tandjongsari, distance 12 kilometres. This section was opened for traffic on 13th February, 1921. The preliminary work of the construction of the line Tandjongsari-to Soemedang, distance 30 kilometres, has been stopped, because of the decision of the board of directors of the state railways to examine a less expensive route for electric tractive power. Total expenditure amounts to fl. 1,214,213.

(*b*) *Bandoeng (Karees station)—Bandjaran-Soreang, with connection Kiaratjondong-Karees.*—This tramway starts from Ban-

doeng and runs in a southerly direction, and was opened for traffic on 13th February, 1921. Distance 26 kilometres. The total expenditure amounts to fl. 579,246.

(c) *Soreang-Tjwidei.*—This line will be 12 kilometres long. The preliminary work has been completed. The acquisition of land can commence. The total expenditure amounts to fl. 94,135.

(d) *Tjiteureup-Madjalaja.*—This line was nearly completed on the end of the year. Total mileage is 17 kilometres. The total expenditure amounts to fl. 698.958.

4. *Tramway Toeloengagoeng-Trenggalek-Toegoe.*—This line starts from Toeloengagoeng station on the mainline Kertosono-Blitar and runs in a westerly direction to Tjampoerdarat, a distance of 14 kilometres. This section has been opened for traffic on 15th July, 1921. The construction of the section beyond Tjampoerdarat a distance of 35 kilometres is in progress. The total expenditure amounts to fl. 1,849,783.

5. *Tramways in South Sumatra.*—(a) *Lampong Palembang connection.*—From the Lampong line, which starts from Oosthaveh (Pandjang), already 102 kilometres, have been opened for traffic, viz. :

Pandjang-Tandjongkarang, 12 km., on 3rd August, 1914.
Tandjongkarang-Laboeanratoe, 5 km., on 1st March, 1915.
Laboeanratoe-Tegineng, 22 km., on 1st November, 1915.
Tegineng-Hadjipemanggilan, 24 km., on 1st February, 1917.
Hadjipemanggilan-Blambangan, 14 km., on 1st February, 1918.
Blambangan-Kottaboemi, 20 km., on 2nd January, 1921.
Branch line Telokbetong-Garoentang, 4 km., on 27th May, 1921.

Work on the second section is in progress. After the bridge over the Wai Rarem river near Kottaboemi had been completed, the laying of permanent way could be continued beyond Kottaboemi.

The following section of the Palembang line has been opened for traffic : Kertapati (Palembang)-Praboemoelih, 78 kilometres on 1st November, 1915. The work on the section Praboemoelih-Martapoera (128 kilometres) is in progress. Earthwork is completed to the 84th kilometre.

(b) *Praboemoelih-Moearaenim.*—This tramway starts from Praboemoelih on the mainline Palembang-Oosthaven and runs in westerly direction to Moearaenim, distance 74 kilometres. The section Praboemoelih to Goenoeng Megang (4.5 kilometres) has been opened for traffic on 1st December, 1916 and the section Goenoeng Megang-Moeara enim (29 kilometres) on 2nd April, 1917. The total expenditure on the lines (a) and (b) amounts to fl. 36,330,928 on 31st December, 1921.

(c) *Moeara enim-Tandjong.*—This tramway, 13 kilometres long, was opened for traffic on 1st September, 1919. Its principal object is to carry off the output of the state collieries at Bukitassam. The total expenditure on the construction amounts to fl. 852,817.

(d) *Moeara enim Lahat.*—The work is being executed by a contractor. The distance between terminals is 38 kilometres. The total expenditure amounts to fl. 1,683,783 on the end of 1921.

6. *Railroads and Tramways in West Sumatra.*—(a) *in the Province of Sumatra's West Coast.*—(1) *The Tramway Pajacombo to Limbanang,* distance 20 kilometres, starts at the terminus Pajacombo of the railway Emmahaven-Padang-Fort de Kock-Pajacombo and was opened for traffic on 19th June, 1921. The total expenditure amounts to fl. 650,587.

(2) The work on the line Moeara kalaban to Moearo, distance 26 kilometres, is in progress. The completion is urgent in view of the timber supply to the Sawaloento collieries. The expenditure till 31st December, 1921, amounts to fl. 1,077,381.

(b) *In the Province of Tapanoeli.*—The construction has been stopped, because of the reduced construction capital expenditure and the building of other lines being more urgent.

7. *Tramways in Celebes.*—(a) *Makassar-Takalar.*—This tramway starts from Makassar, the capital of the government of Celebes, and runs in southerly direction to Takalar, distance 45 kilometres. The construction is nearly completed.

(b) *Makassar-Maros-Tanete.*—The distance from Makassar to Maros is 29 kilometres and from Maros to Tanete it is 57 kilometres.

The survey and estimates have been completed. The acquisition of land is advanced to Maros. In view of reduced construction capital the construction is not yet commenced. The expenditure amounts to fl. 2,833 410.

§ 3. IMPROVEMENT AND EXTENSION

The most urgent works only have been continued.

At and near Batavia the following works were in progress or have been completed : The main building of the new Passarsenen station has been roofed : The connection Manggarai-Tanahabang has been nearly completed and can be handed to the open line in a short time. The earth work to the lines Batavia to Angkee and Antjol to Tirem has been completed. The approach roads and squares near the freight yard of Tanahabang are under construction. The freight yard at Batavia station was nearly completed. A portion of the goods shed was ready for use. The two stations Batavia-North and Batavia-South will be closed. A new station, of which the survey and estimate are completed, will be constructed. Before starting the construction the whole traffic has to be concentrated at the station Batavia-North so that the station Batavia-South can be demolished. To that effect the Station Batavia-North is undergoing an important alteration. The construction of the main building of the station of Tandjong Priok is nearly completed, the station yard is in progress. Railway tracks on the harbor grounds have been additioned. Between Antjol and Soengeitiram a fifth track has been laid in behalf of earth supply and later on for separate freight traffic. At Manggarai some houses for the staff were completed.

At and near Sourabaia the principal work done is: The bridge over the Kali (river) Pagirian is in progress. The reinforced concrete piles of the viaduct over the Passarbesar street are completed. The bridge over the Kali (river) Mas is in progress. The engine sheds with offices at Sidotoppo and Kali Mas are completed. The gravity marshalling yard at Sidotoppo is completed. The work on a new storehouse for munition on the ground of the royal navy is commenced.

The work done *at Bandoeng* was : The deviation of the rivers Bangkok and Beunjeung near the station yard of Tjikoedapateuh and the canal which had for be dredged for that purpose, are nearly completed. Several sidings and spurs are completed. The station at Kiaratjondong was handed to the transportation. The auxiliary station yard is in progress. The parallel track between Bandoeng and Andir are completed. The house on the grounds which has been acquired for a marshalling yard at Tjimindi has been accommodated for a boarding-house for government officers. The building of a storehouse for the ticket printing office is commenced. The approach roads to the freight yard at Tjirojom have been metalled.

§ 4. ELECTRICAL BRANCH

In view of the advanced construction of the waterpower stations a decision has been made with regard to the current system to apply to the sections Tandjong Priok-Batavia-Meester Cornelis and Meester Cornelis-Buitenzorg. It is decided to apply direct current of 1,500 volt. The survey and plans of the section Tandjong Priok to Meester Cornelis were completed, so that tenders could be invited for the delivery of sub-stations, conduits and rolling stock. The electric light installation of the new freight yard at Batavia is completed. The installation at Tandjong Priok is commenced.

Tin Mines of the N. E. I.

COMMERCIAL working of tin deposits takes place on the islands of Banka, Billiton, and Singkep, situated off the southeast coast of Sumatra. The total production of tin in the Dutch East Indies during 1920 amounted to 21,991 metric tons, a small increase over the output in 1913 (21,200 tons). The was all produced by the government mines at Banka (13,427 tons), the Billiton Tin Mining Maatschappij (7,956 tons), and the Singkep Tin Maatschappij (608 tons).

The production of the Banka mines, which are owned and operated by the government, under the direction of the department of government enterprises, is by far the most important factor in the industry, since it amounts to nearly 60 per cent. of the total production of the colony. The latest statistics available regarding the Banka workings, compared with immediately preceding years and with the pre-war year of 1913, are:

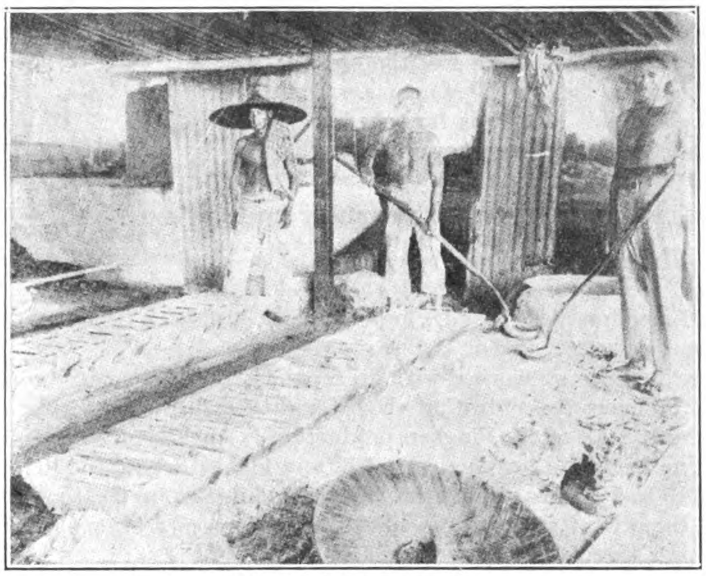
Item.	1913	1918	1919	1920
	Number.	*Number.*	*Number.*	*Number.*
Mines or pits	362	325	301	300
Average labor force	21,436	18,658	18,627	21,722
	Tons.	*Tons.*	*Tons.*	*Tons.*
Production	15,752	12,055	12,191	13,427
Tin auctioned in Holland ...	15,390	36	893	12
Tin sold in Dutch East Indies	—	10,934	15,047	9,326
Cost of production per picul, including freight and selling charges	*Florins.* 45	*Florins.* 50	*Florins.* 56	*Florins.* 59
Average selling price per picul:				
In Holland	152	228	189	204
In Dutch East Indies ...	—	204	176	195
Net receipts	36,566,674	36,277,380	46,227,847	29,025,717
Net profits	25,219,074	25,803,489	*	*

* Not yet made public.

No statistics are yet available for 1921 except for the number of mines or pits, 293, and the average labor force, 21,273 persons. Net profits for 1919 and 1920 have not yet been declared.

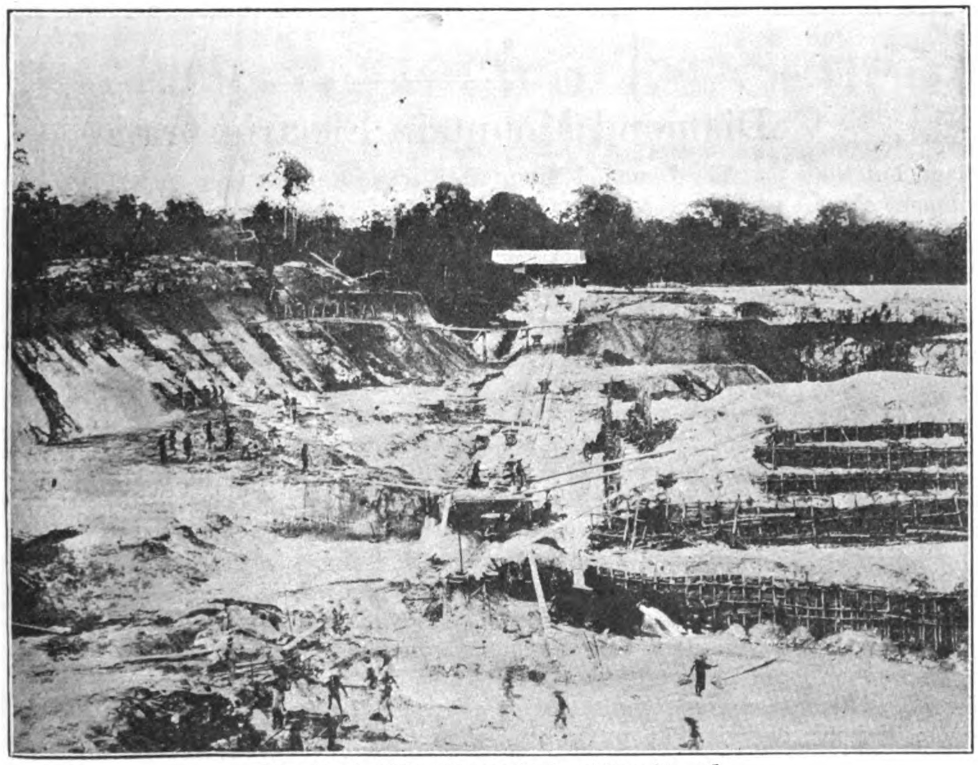
Banka Smelters--Maketing Government Tin

Contrary to what is done on Billiton, the tin of Banka is smelted on the island itself. Formerly each tin field had its own smelter, but during the last year smelting has been considerably centralized and at present there are reduction plants only at Blinjoe. Besides the vertical kiln, which is still being used for smelting the ore (the so-called Van Vlaanderen furnace), the flame furnace has lately been put into operation in Banka, through which the loss of tin will be greatly reduced. The tin of Banka is considered to range among the purest kind found; a purity of 99.97 per cent. is guaranteed, which is, however, usually exceeded. There has long been an agitation to concentrate all the tin smelting activity at one place, especially that with reference to the Banka and Billiton outputs.



Tin Smelting at Banka

Before the war all of the government [Banka] tin was shipped by the Nederlandsche Handel Maatschappij and auctioned in Holland, no sales being effected in the colony, but since that time all sales are conducted direct by the government through its bureau voor verkoop, departement van gouvernementsbedrijven, at Weltevreden, Java. Low prices and a lack of demand have resulted in very large accumulations of tin stocks here and at Singapore, the total amount of which is difficult to estimate. A few months ago it was reported that the governments of the Federated Malay States and of Netherlands India had agreed to withhold stocks from the market until prices improved, or at least to limit the export to small quantities. It was also reported that the Banka and Billiton mines would be closed down pending an improvement in prices, but the latter report has not been confirmed.



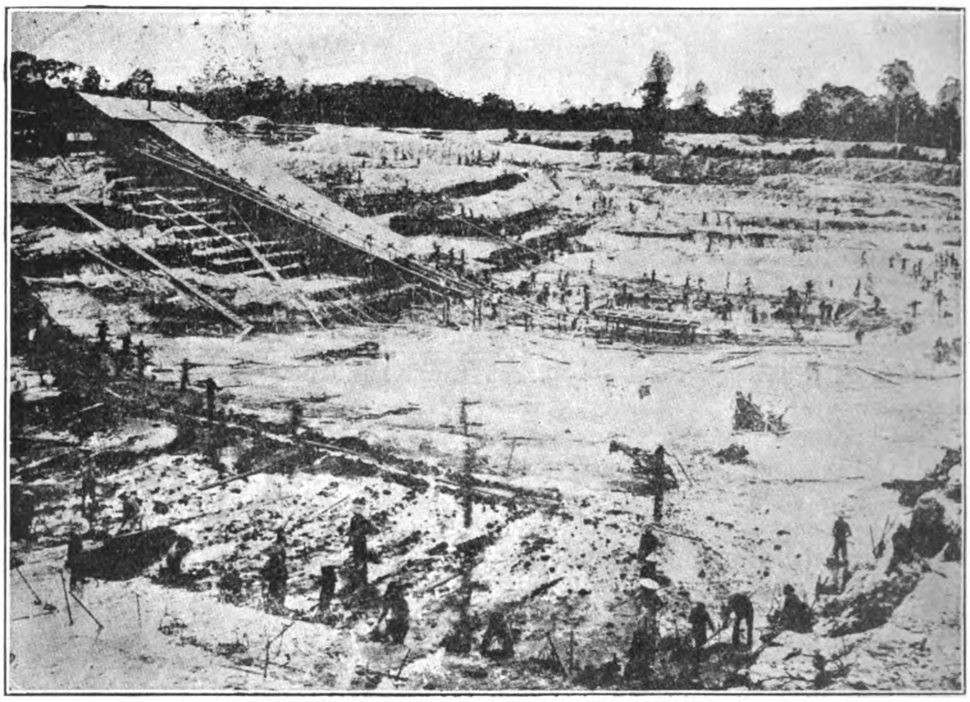
The Banka Tin Mines: Koba, Mine No. 35

The Billiton Mines

The tin deposits on the island of Billiton are operated by the Billiton Maatschappij under a concession obtained from the government in 1852 which in 1892 was extended for a period of 35 years, by virtue of which five-eighths of the net profits go to the colonial government in the form of a royalty. It is understood that the concession will not again be renewed by the government and that it definitely expires in 1927. It is generally believed that the government will continue the operation of the mines on its own behalf. The private interests controlling the Billiton

Maatschappij have formed in Holland a new company called the Stannum Mining Co. with a capital of 500,000 florins (florin at par= $0.402) for the purpose of taking over the machinery and equipment owned by the old company, probably with a view to operating in some other field after 1927.

The work is done by Chinese coolies under contract, the average number of laborers in 1920 being 18,000. In 1914 there were 47 mines or pits being worked, and in 1918 only 30. Production in 1913 amounted to 4,453 metric tons, in 1917 to 6,492 tons, in 1918 to 6,945 tons, in 1919 to 7,325 tons, and in 1920 to 7,956 tons. Electrical equipment has been installed for the working of the ore, the largest installation being at Manggar. The motive power at this station is furnished by six Diesel motors of 1,200 horse-power each.



The Banka Tin Mines: Koba, Mine No. 38

The Singkep Mines—Exports from Java

The Singkep Tin Co. received its concession from the government in 1889. Besides the ore found on the island, important deposits were discovered under the sea close to land. These deposits are worked with dredgers, the mud being put through a preliminary concentration aboard and then further concentrated on shore. All of the Singkep production is smelted at Singapore. Production in 1913 amounted to 672 metric tons, in 1917 to 770 tons, in 1918 to 514 tons, in 1919 to 717 tons, and in 1920 to 608 tons.

Exports of tin from the island of Java (in metric tons) during the past three years were as follows:

Countries of destination.	1919 *Tons.*	1920 *Tons.*	1921 *Tons.*
Netherlands	7,032	7,029	5,152
Great Britain	2,570	4,205	6,378
Germany	—	14	387
France	415	105	303
Japan	880	695	1,177
All other	5,355	1,600	142
Total	16,252	13,648	13,539

Mining in Siam

TIN and wolfram are the only metallic ores which figure in Siam's exports. Gold mining has been attempted, and rich deposits of lead and silver have been reported in north Siam, but the inaccessibility of the mining land has made the development slow. The sapphires which are named in the customs report (Tcs 2,569,762 in 1920-21) are mined by Shans at Pai-lin, French Indo-China, formerly Siamese territory, and are exported through Bangkok.

Modern tin mines are entirely in the hands of foreigners. Australian capital controls most of the tin workings, although some English, and a small amount of French and Danish, money is invested in tin. Chinese work numerous open-pit mines by hand but their operations are so irregular and their mines vary from two women panning ore in a creek to an organization employing a hundred coolies, that it is difficult to keep track of them.

The Siam Coal Mining Company, Ltd., which is about to begin operations at Bandon, Southern Siam, is the first all-Siamese mining company to undertake large scale workings.

Practically all tin ore mined in Siam is smelted at Penang.

Tin is produced in five provinces in Siam, viz., Puket, Surashtra, Nakon Sri, and Patani. Puket has always produced more than all the other provinces combined. For the year ending March 31, 1921, the figures were as follows: Puket, 87,605 piculs; Nakon Sri, 9,417 piculs; Patani, 6,186 piculs; Surashtra, 974 piculs. Nakon Sri also produced 1,936 piculs of wolfram ore at an average price of $32.92.

The figures for the output of the last five years follow:

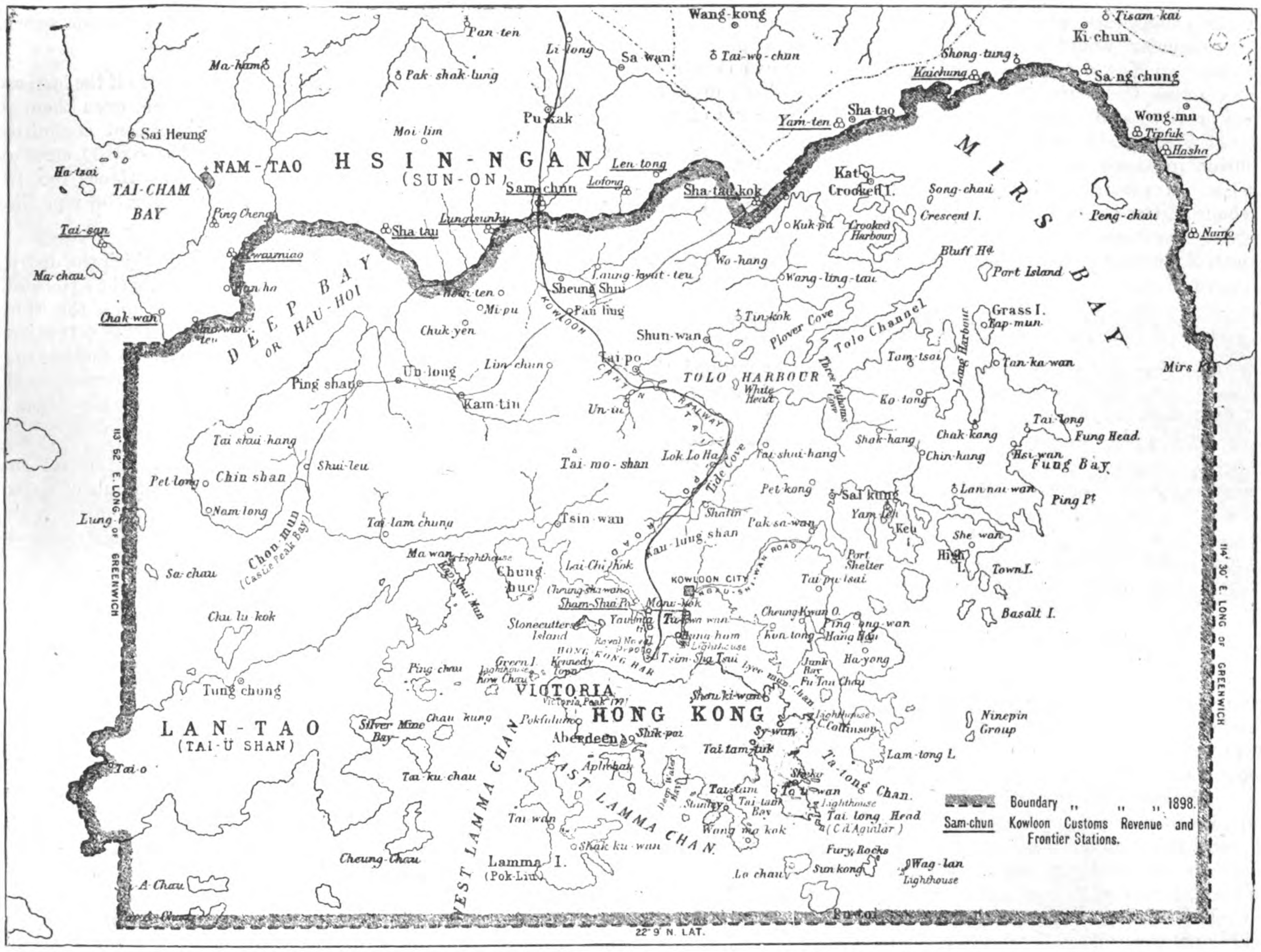
Year Ending March 31	Tin Obtained from Dredging. Piculs	Tin Obtained from Other Sources. Piculs	Total Piculs	Average Price in Straits Dollars Per Picul
1917 ..	47,298	99,961	147,259	89.00
1918 ..	51,343	102,439	153,782	22.00
1919 ..	52,124	96,301	148,425	147.84
1920 ..	74,993	68,513	143,506	148.30
1921 ..	59,013	45,170	104,183	129.95

TIN PRODUCTION BY PROVINCES IN 1922.

	April	May	Average Price	April	May
Patani	681	670			
Nakon Sri ..	918	1,084	Tin	$76.90	76.47
Puket	6,560	6,593	Wolfram	11.33	14.20
Piculs..	8,159	8,347			

Diamond Mountain Electric Tramway

The Diamond Mountain Electric Railway Company is steadily pushing on construction work and the laying of track will be begun between Cholwon on the Seoul-Wonsan line and Kimwha, a distance of 18 miles, early next spring. The same Company has also obtained official permission to supply electricity to Seoul and Koyang district, and it is expected that the supply will be started by September of next year, when the electric railway traversing the district will possibly be opened to traffic. The Company has a nominal capital of five million *yen* and has the far larger portion of it still to be called for. In view of the present stringency of the money market the Company is apparently hesitating to call for further payment, and it is interesting to note that Dr. T. Kume, president, has recently sold his very fine property in Yoyogi, suburb of Tokyo, to Marquis Y. Tokugawa for two million *yen* with a view to investing the entire proceeds of the sale in the enterprise of his Company. It appears that the courage and firm determination of Dr. Kume accounts for the progress made by work the Diamond Mountain Railway Company as contrasted with the tardy, or rather lack of, progress made by certain other light railways organized about the same time, that is, when the war boom was at its height.



Map of Hongkong and the British Leased Territory of Kowloon showing Taimoshan and the Shing Mun River with outlet at Tide Cove, which it is proposed to impound and pipe the water down to Kowloon Point and thence by submerged mains across the Harbor to Hongkong

Great Waterworks Scheme for Hongkong

Water from Taimoshan Mountain

In a leading article on the water shortage, the Hongkong *Daily Press* suggested that a solution of present difficulties would be found by "looking ahead and drawing the principal supplies for the whole colony from the mainland, and from the hinterland of the peninsula rather than from areas which may, within a century, be required for business or residential purposes." We have since gleaned information, says the *Daily Press* in a subsequent article, as to proposals now under consideration by the government for vastly increasing the water supplies of the colony and, whether they are adopted in their entirety or not, they undoubtedly show that the government's advisers are quite ready to take long views and to consider the requirements not of a decade or even a generation but of many years to come.

The chief proposal before the government does the very thing the *Daily Press* suggested ; it taps the hinterland of the peninsula in a way that would put a very considerable supply of water at the disposal of the colony. The scheme has been in preparation in the public works department for a very long time. Plans have been prepared by the executive engineer of the waterworks, Mr. R. M. Henderson, for collecting water for both Hongkong and Kowloon from Taimoshan mountain. The southern slopes have been selected as the catchment area and the large stream which at present finds its way to the sea at Shatin will be impounded. This stream has an average dry weather flow of over one and a half million gallons a day. In the Shing Mun valley two reservoirs, each with a capacity of about 1,000 million gallons, will be constructed.

A portion of the catchment area slopes away from the reservoir but by means of a catchwater this gathering ground, and the product of another fair sized stream, will be added to the scheme.

The catchment area can be still further enlarged when required by extending catchwaters to include other slopes of the mountain. Enormous volumes of water would thus be drawn upon.

Submerged Main Under the Harbor

From the two great reservoirs water would be brought down by conduit, and in some parts by tunnel, to a point very near the existing Kowloon filter beds. Supplies would be taken off for

Kowloon waterworks when that supply needed replenishment, and the remainder would be brought by iron mains to the harbor frontage at Kowloon point. The scheme proposes to bring the water across the harbor by a submerged main and a supply at good pressure can then be made to the lowest districts of the city of Victoria. It will be readily understood that there are difficult problems connected with laying a main beneath the harbor. A recent number of an engineering journal gave an account of damage done to such a pipe beneath New York harbor by the operations of a dredger. Important questions as to the length of life and replacement cost of such a pipe will also have to be considered.

Tunneling Through Hills

A scheme of the magnitude of the one here briefly outlined will of course take years to complete. Some portions of the operations are likely to be more difficult than others and to take a considerable time. Tunneling through intervening hills, when the water conduit is being constructed will be a very arduous business. But, since the course of the channel will be known, the tunneling can be begun at the first possible moment. It is bound to be a slow business since only a limited number of people can work at the face of a tunnel, and obtaining additional faces by sinking intervening shafts would greatly add to the cost of the work.

Providing for Immediate Needs

The proposals now before the government also provide for more immediate necessities. It is proposed that *pari passu*—as the lawyers say—with the large scheme just outlined, extensions shall be made at Kowloon reservoir and additional catchment areas brought into service on the island of Hongkong. So great is the increase in population and the demand upon the water supplies that, if extensions of existing undertakings were not put in hand the demand would greatly exceed the supply long before the Taimoshan scheme was completed. If the big scheme is put in hand, however, the extensions of existing works can be framed on relatively less expensive lines. It is proposed to provide an additional reservoir at Kowloon, as it will be possible to construct one to contain 100 million gallons or thereabouts, at a comparatively moderate cost. An extension of the catchment area will also the made there.

On the island, another 2,600 acres can be added to the catchment area of the Taitam-Wongneichong chain of reservoirs. Some idea of the additional quantity of water that would find its way to the reservoir may be gathered from the fact that one inch of rain over such an area would represent about 60 million gallons, and any springs or streams within the area would be additional. According to the report of the committee which recently considered the feasibility of extending the water carriage system, the inclusion of this 2,600 acres would increase the supply at Taitam (without further reservoirs) from its present figure of 7 millions to 10 millions a day. " The Kowloon Works," this report states, " will produce 1.7 million gallons a day in the driest recorded year and can be considerably extended at a comparatively small cost. The present supply is about 1.7 million gallons a day."

Estimates of Future Requirements

These figures give the clue to the need for extension of the colony's water supplies. The percentage of increase in consumption in Hongkong in 1921, compared with 1912 was over 72 per cent, and in Kowloon 69 per cent. But a considerable proportion of this increase accrued in the last three years of the period. If the years 1918 to 1921 are taken, the percentage increase of consumption for Hongkong is 29 per cent. and for Kowloon nearly 36 per cent. If the rate of increase of consumption of those three years continue, the daily consumption in 1924 would be: in Hongkong, over 10 million gallons a day—an aggregate increase of 900 million gallons; and in Kowloon, nearly 2½ million gallons—or an aggregate annual increase of nearly 250 million gallons per annum.

In other words, the demand of Hongkong in 1924 if the increase of consumption is not checked is expected to be, even then, in excess of the 10 million gallons a day that the recent committee said the island waterworks would provide if the 2,600 acres of additional catchments were all in full operation. Hence the necessity for the Shing Mun valley scheme and for the pipe line across the harbor.

As for Kowloon, the 2½ million gallons a day which the district is estimated to need in 1924 will not be fully met by the extensions proposed, and Kowloon, also, will draw largely upon the Shing Mun scheme for supplies, as soon as they are available. If meters are introduced in the meantime, some reduction in the demand may result, but too much must not be expected on this account as the extraordinarily rapid development of the colony makes much of the increased demand inevitable.

It is too early yet to give any estimate of the cost of the schemes proposed. The sum is bound to run into many millions of dollars but ultimately the colony may expect to have the ample water supplies necessary for public use and for maintaining the water service to the port.

Cost of Building in the Straits Settlements

MR. J. H. W. Park, colonial engineer, writes as follows in his annual report :—

In the 1919 report my predecessor gave some interesting figures in regard to recent changes in prices of labor and materials. Such figures, however useful, do not convey to the mind the effect they have on construction of public works. I have recently had tables compiled showing the cost of similar works or buildings in the various settlements during the last three years. It is not possible to refer to these in detail but a single instance will suffice.

The cost of building a first-class quarter in Singapore containing 6,000 square feet of floor space, 1,125 square feet of outbuilding and 150 feet of covered way complete with water, electric light, tennis court, road and fence but not including land, sewers or piled foundations, was in May, 1919, actually $21,256; in August, 1920, this cost became $57,619; while in May, 1921, it was $38,846. These figures are from accepted tenders.

When it is remembered that public works officers have as a rule to prepare estimates between June and October for works to be undertaken probably between March and September of the following year their difficulties in the face of the variations in price thus disclosed are obvious. Actually for 1920 they provided $21,000 per house while for 1921 there was allowed $41,250.

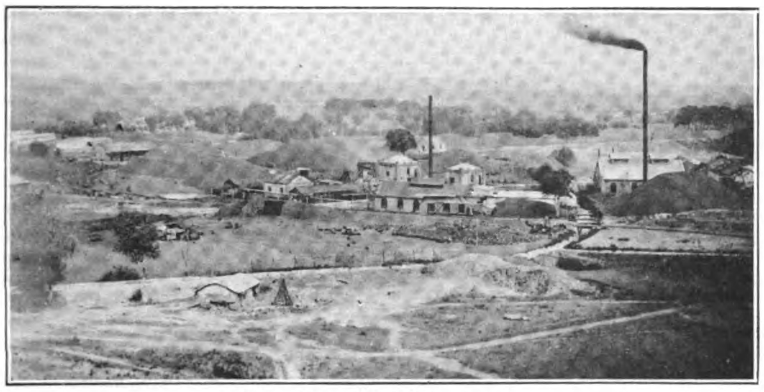
I judge 1919 building prices to have been 20 per cent. on the average above those of 1916 while those of 1920 were 150 per cent. and those of 1921 about 75 per cent. above the corresponding ones of the same year. On these figures the building program of 1919 was double that of 1916 while that of 1921 was four times greater than that of the same year.

It is possible to apply somewhat similar reasoning to roads where prices are mainly dependent on local labor and it is not difficult to deduce therefrom that road work has probably increased about 75 per cent.

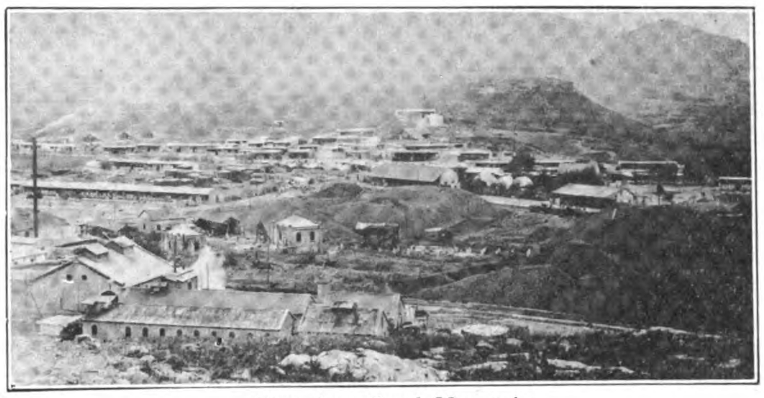
These considerations show very clearly how the duties of individual members of the department have been added to in recent years.

Liuchang Coal Mines

THE Liuchang coal mines are located about 13 miles north of Chinwangtao and connected with the port by a 30-in. narrow gauge railway. These mines have a daily output of 400-500 tons, mined from two inclined and one vertical shaft. The two inclined shafts are each equipped with a 40 H.P. hoisting engines. There is also two ventilating shafts and one auxiliary shaft with a small winch.



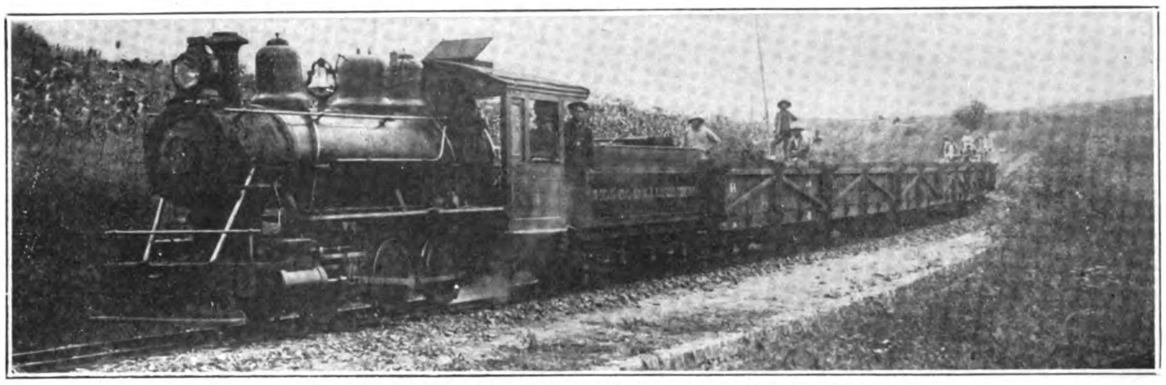
View from East Mountain



View from South Mountain

LIUCHANG COAL MINES, 1922

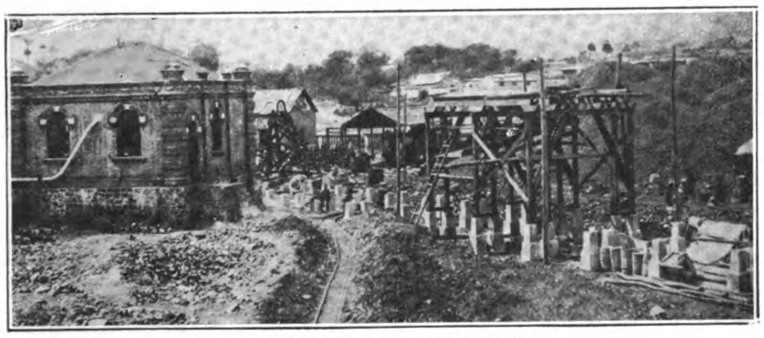
The machine shop is equipped with a 15 H.P. engine, lathes and other machine tools to take care of repairs. A model-making room, blacksmith shop, foundry and fitting room round out the shops. The battery of boilers of the Lancashire type, produce 450 H.P., while a 10 kw. set lights the mines.



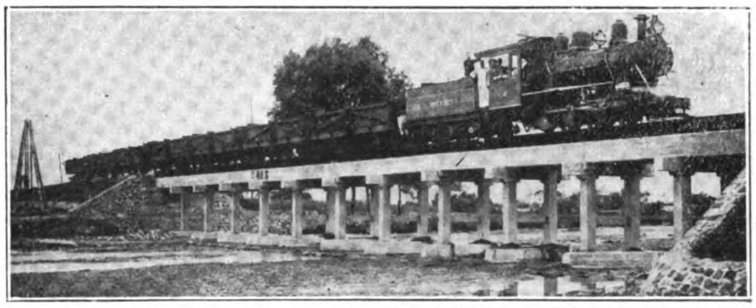
Baldwin Locomotive Hauling Coal Train of Koppel Cars

In the mines are two stage pumping plants that take care of the two 8-in. pipe lines. In addition, there are two five-inch pipe lines connected to steam pumps, which are to be replaced in the near future by electrically driven pumps.

The railroad equipment consists of three 10-ton Vulcan locomotives, one 20-ton Baldwin locomotive with tender and one 20-ton Borsig locomotive on order and which is expected to arrive shortly. Forty-four 4-ton steel coal cars and twenty 10-ton wooden coal cars complete the rolling stock. The mine cars consist of 100 wooden and 125 steel coal cars. The railroad bridges are of the trestle type, most of which are of reinforced concrete, of which material, some of the culverts are also made.



Inclined Shafts and Screening Plant



Reinforced Concrete Trestle Bridge at Kouchang

South Vertical Shaft

The head office of the company is located in Shanghai, It is capitalized at $1,440,000. of which $1,000,000 has been paid up.

The Master American Builder in Japan

The Work of the George A. Fuller Company of the Orient, Ltd.

JAPAN emerged from the war with a last amount of world trade at her door and an acute shortage of buildings to house her increased business. For the last two years her representative have been studying the building methods of Europe and America and they have decided that the made in America business buildings are superior to all others and thus about seventy years after Commodore Perry of the United States navy opened up the ports of Japan to American commerce the Nippon kingdom is opening its doors to the best brains of the United States in the business of erecting monuments of steel, concrete and granite dedicated to the god of business and trade.

The honor thus conferred on the United States was actually unsought. For many months the Japanese were in the United States canvassing the field and finally decided on a prominent New York firm of builders as being best qualified to organize the business of putting up American business buildings in Tokio and other big cities in Japan. The concern selected was the George A. Fuller Company.

If the Japanese had entered the offices of the Fuller Company merely to award a contract or so for the construction of modern office and business buildings in Tokio it is likely that they might still be looking for some one to accept those contracts as it has been a more or less well defined policy of the company to centre its attentions on building operations in the United States rather than in foreign lands.

The New Home of the Great Mitsubishi Company of Tokyo, the largest Office Building in Asia

But the Japanese came to the company seeking help instead of bearing gifts in the form of contracts. Their commissioners made plain at the outset that they wanted the American builders to go to Japan and teach the Japanese the best and most modern methods of building in order that Japan might start on her campaign of modernizing her great cities at the present point of efficiency and perfection reached by the American builders. They signified their desire that the Americans should go to Tokio not merely as

builders but as teachers to train and educate the Japanese architects and engineers in the school of modern American construction methods.

This modern Macedonian call, according to the Fuller Company officials, could not easily be ignored. Arrangement to take over a complete American organization to Tokio, therefore, were made. The organization was called the George A. Fuller Company of the Orient, Ltd. Many prominent Japanese business men, architects and contractors are interested in the concern. Baron Shibusawa, a member of the recent peace commission, and Baron Kondo are among the directors.

"As far as fundamental methods are concerned," say the officials of the George A. Fuller Company, "the buildings which the the Orient, Ltd., are completing in Tokio differ little from those which the Fuller Company has been erecting in the United States during the last few months. Of course, the prevalence of earthquake troubles, although not always violent, necessitate the use of much heavier steel parts. Each of these structures forms as near as is practicable a modern American fireproof type of office building and at the same time keeps them in conformity with the customs and laws of Japan. The building law of Tokio limits the heights of all structures to 100 feet from grade to top cornice. All

Magnificent New Head Office Building of the Nippon Yusen Kaisha, whose Steamers carry the Flag of the Rising Sun on all the Important Trade Routes of the World

the structural steel work was designed, fabricated and shipped from the United States."

This is the first real step to Americanize the construction and building business of Nippon. According to the officials of the Fuller Company, the Japanese are exceedingly adaptable to the task of assimilating the American methods. They seem to display practically no desire to cling to tradition in architectural motifs or engineering methods.

The organization which the Fuller Company took to Tokio included several Japanese who had studied building methods in New York and other American cities. Since it reached Tokio it has taken on a large number of Japanese architects and engineers who are students of every engineering job. In fact, the operations, now going on in Tokio, are schools for native Japanese engineers and architects throughout the empire.

Marunouchi Building

The largest operation on which the Company is engaged is the Marunouchi building, owned by the Mitsubishi Goshi Kaisha in the Marunouchi district. It is to be used exclusively as an office structure, is the largest structure of its kind in Asia, as it covers a plot measuring 300 by 350 feet, is eight stories high and is of structural steel with reinforced concrete arches and cement floors.

The exterior of the structure consists of a granite base succeeded by a story of architectural terra cotta and above that by six stories

of brick work faced with the Japanese type of finishing tile, which comprises the shaft of the building. The remaining story tops the building and is made of cement stucco work. The architect is Dr. Kotaro Sakurai. The cost of the structure will be approximately $5,000,000. It will be completed in December, 1922.

Area : Basement	77,864 sq. ft.
First floor	77,864 ,, ,,
Second floor	72,792 ,, ,,
3, 4, 5, 6, 7 and 8th floors	436,652 ,, ,,
Ninth floor	12,544 ,, ,,
Total	677,716 sq. ft.
9 stories : Tsubos	18,825

The main cornice is of ornamental reinforced concrete. The parapet over the main cornice is of reinforced concrete faced with ornamental artificial stone.

The interior partitions are of solid brick, hollow brick reinforced with steel, reinforced concrete, hollow terra cotta tile reinforced with steel and steel studs with metal lath and cement plaster.

General Features : *Basement*.—Boiler room ; coal room ; kitchen ; café and dining room ; store rooms ; motor generator room ; transformer room ; pump room ; battery room.

First Floor.—Stores opening on all four elevators. Two passage-ways or arcades—one running north and south, the other east and west, intersecting at the centre of the building. Both sides of arcades lined with stores. Elevators open to large elevator

Seven Story Structure Erected for the Japan Oil Company in Tokyo

lobbies. Arcades and elevator lobbies finished with marble walls, ornamental plaster ceilings and heavy tile floors.

Second to Ninth Floors, inclusive, are for general offices to be rented. All offices to have linoleum floors on cement with white plastered walls and ceilings. All offices are outside rooms. Toilet rooms are provided on each floor equipped with high-grade American-made white enamelled toilet fixtures. These rooms have walls of glazed tile and terrazzo floors.

Mechanical.—Two septic tanks ; ten passenger elevators ; One freight elevator (electrically operated) ; steam-heating plant in basement with radiators in each office ; mail chutes ; motor

General Construction.—Foundation composed of American wood piles 45-ft. to 55-ft. in length with heavy caps or footings of reinforced concrete. Superstructure is of steel skeleton frame throughout, with reinforced concrete floors and all steel protected from fire and dampness with reinforced concrete covering.

Exterior walls at the first floor are constructed on heavy brick-work faced with granite and artificial stone. The exterior walls from the second to the seventh floors inclusive are constructed of heavy brick and reinforced concrete faced with a light buff colored facing tile. The walls at the eighth floor are faced with ornamental cast stone and backed up with brickwork and reinforced concrete.

generator sets; pumping plant for water supply; complete electric light and power system; telephone system, all offices; kitchen and cooking equipment; dining and service rooms; gas supply where desired.

Building started, November, 1920. Completed, December, 1922.

Japan Oil Building

The Japan Oil Company building, which is being erected for the Japan Oil Company, Ltd., Tokio, Japan, is a seven story office building of steel skeleton construction, with reinforced floor arches and cement floors. Sone & Chujo are the architects. The cost is approximately $1,500,000 and the date of completion June 15, 1922.

Area : Basement	26,565 sq. ft.
First floor	26,565 „ „
Second floor	23,541 „ „
3, 4, 5, 6 and 7th floors	117,705 „ „
Total	194,376 sq. ft.
7 *Stories and Basement* : Tsubos	5,400

Construction.—American wood piles, 45-ft. and 50-ft. long, capped with heavy reinforced concrete footings supporting the skeleton steel frame. Steel frame fabricated in and shipped from the United States. Floors of steel beams and reinforced concrete. Exterior covering consists of granite base courses with *tsukide* stone to the level of the third floor. Remainder of exterior walls are of American architectural glazed terra cotta backed with solid and hollow brick. Roof is of felt and gravel with sheet copper flashings. Interior partitions are of reinforced concrete and hard burned hollow terra cotta blocks.

Features

Basement.—Steam-heating plant. Garage, 36-ft. by 56-ft.; kitchen and service rooms; barber shop; dining rooms; motor generator and pump rooms; store rooms.

First Floor.—Two main entrances furnished in marble, terrazzo and ornamental plaster. Large grand hall in marble, terrazzo and ornamental plaster, with solid marble grand stairs and bronze ornamental balustrade and ornaments.

Two large banking rooms (Sumitomo and Mitsui) equipped with reinforced concrete vaults and Mosler steel combination vault doors.

Telephone room with three booths, post office, two stories cigar and news stand.

Second Floor.—Three banking rooms and miscellaneous service rooms.

3rd, 4th and 5th Floors.—General offices—rented. Linoleum floors on cement, white plaster walls and ceilings. Tiled walled toilet rooms on each floor with enamelled Japanese style and American fixtures. All offices with windows opening to daylight.

6th and 7th Floors.—General and executive offices of the Japan Oil Company. Same general features and conveniences as other floors.

Mechanical.—Septic tank; 4 passenger elevators; 1 freight (electrically operated); Steam-heating plant with radiators in all offices; modern system of toilet fixtures and plumbing installation; motor generator sets; complete telephone system; mail chute; All electric wiring enclosed in steel conduits and wiring installed after conduit work has been completed; 68 offices—but entire building not yet subdivided.

Building started, October, 1920. Completed, August, 1922.

Yusen Building

The next building is also an office structure for the Nippon Yusen Kaisha (Japan Mail Steamship Company), also in the Marunouchi district of Tokio. The site is approximately 160 feet by 300 feet and the structure seven stories high. The building is also of structural steel, skeleton type, with reinforced concrete flat arches, cement floors and architectural terra cotta exterior over a granite base. The architects are Sone & Chujo. The cost of the building is approximately $3,000,000, heating, plumbing, ventilating and electric materials, mail chutes, copper and kalamein iron fireproof, doors, jambs and it is expected that it will be ready for occupancy in December.

Net Area : Basement	44,352 sq. ft.
First floor	44,352 „ „
Second floor	35,904 „ „
3, 4, 5, 6 and 7th floors	179,520 „ „
Total	304,128 sq. ft.
7 *Floors and Basement* : Tsubos	8,450

Construction.—American wood pile foundations with heavy concrete caps and footings, supporting the structural steel skeleton frame. Floor construction throughout is composed of steel bearing beams and girders which support the reinforced concrete floor slabs. All steel throughout encased and fireproofed with reinforced concrete.

Exterior facing at the first floor of the north-east and west elevations are of granite, supporting American-made architectural glazed terra cotta. This terra cotta continues to the parapet above the main roof. The terra cotta is backed with solid brick with the four inch inner face laid up with hollow brick, to exclude the presence of dampness.

The entire south elevation is laid up in solid brickwork which is covered on the exterior with cement stucco laid off and jointed to represent stone courses. The interior partitions are constructed of reinforced concrete, hollow fireproof tile reinforced with mesh and steel channel and metal lath, all finished in white plaster. The roofing material consists of felt and gravel with certain portions covered with a vitreous tile laid in asphalt.

General Layout.—The basement is occupied by the boiler room, printing room, store rooms, garage, 24-ft. by 66-ft., offices and miscellaneous coal and other rooms containing mechanical equipment.

First Floor.—Passenger department; finance division; supplies division; shareholders registry offices; accounting department; public lobby.

Second Floor.—General Executive Offices.

3rd, 4th, 5th and 6th Floors.—Rentable office space.

Seventh Floor.—Large assembly hall, dining room, kitchen.

Mechanical Features.—Six passenger, one freight and one service elevator, all electrically operated; septic tanks; steam-heating plant; garbage disposal system; motor generator sets; modern toilet rooms, equipped with high-grade white procelain fixtures; complete telephone system; latest American kitchen ranges and appliances; complete equipped service and dining rooms; mail chute; electric lights throughout.

General.—Main entrances: marble wainscot, ornamental plaster cornices, marble and terrazzo floors. All woodwork in first floor will be teak. Upper floors will have cement flooring covered with linoleum. Walls and ceilings finished in white plaster. All woodwork to be of oak finished with varnish. American hardware used throughout—solid bronze. Building absolutely fireproof.

Building started, November, 1920. Completed, December, 1922.

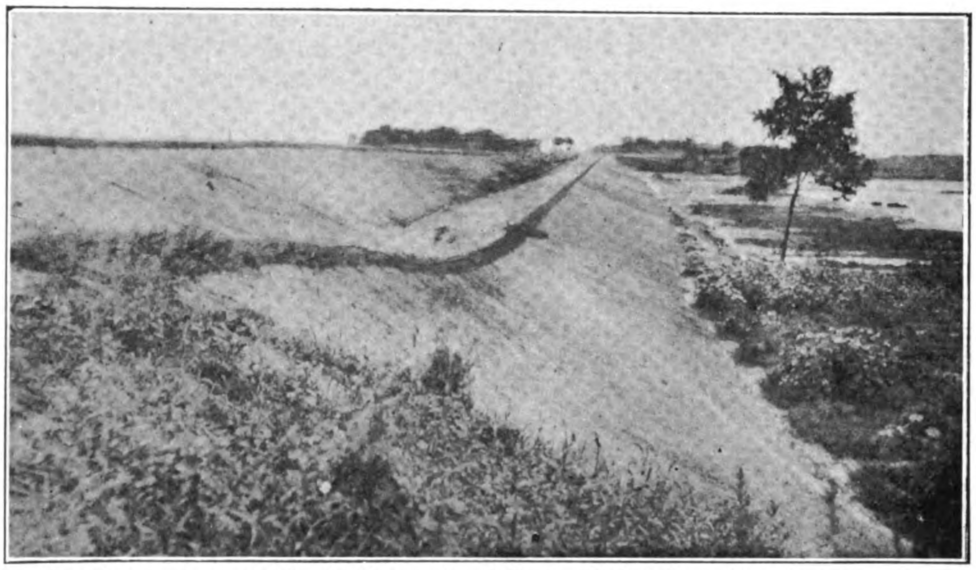
The smallest structure is the Crescent building, Kobe, Japan: owners. Brunner, Mond & Co. (Japan), Ltd. The size is 90 feet square and it is six stories in height. It is an office building of reinforced concrete, flat arch construction and terra cotta front. The approximate cost will be $300,000. The company acted in the combined capacity of engineers, architects and contractors for the building.

Among the many additional materials and trim, polished plate and wire glass, sash chain and fixture, wire cloth reinforcing material, kitchen, equipment, vault doors, finishing hardware, directory boards and linoleum.

The Han River and Its Levees

By H. S. Chuck, A.B., C.E., A.M. Am. Soc. E.C., M.A.C.A.E.

WATERWAYS, including rivers and canals, form one of the most important group of assets contributory to the wealth and progress of a nation. They serve as the common means for the transportation of the produce from the producers to the consumers, thereby linking the inland commerce with that of the outer world. Being essentially an agricultural nation, China should look more to her waterways as the cheap and quick means for the transportation of her agricultural products. She is blessed with large rivers which she may develop to their full advantage to accomplish her ends—the Yellow river feeding the north; the Yangtze river, the central portion; and the Pearl river, the south. But it is regrettable to mention that, in recent years, so very little or no attention at all has been given to their improvement, whereby such results could be effected.



New levee constructed by the International Famine Relief Committee during spring of 1922, showing banquette of levee on land side

Historically, China, by no means, can be said to be backward in the development and improvement of her water courses. The grand canal is a gigantic engineering scheme. She had at one time in her history an emperor who did so much good work towards the conserving of rivers that he is now made a god.

Through the opportunity given me by the China international famine relief commission, committee for Hupeh, as the chief engineer, to take charge of all the levee construction and repairs along the various points of the Han river, from Hankow to Siang Yang, during the spring of 1922, I had the fortune to avail myself of the opportunity to become acquainted with the general conditions and the general characteristics and phenomena of the lower part of the Han. It is upon the knowledge which I thus gained during this short period that the following information is based.

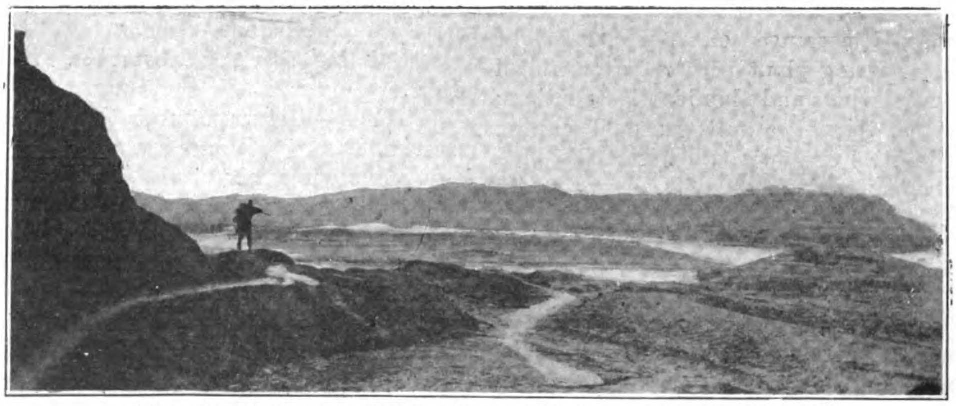
General Description of the Han River

The Han river rises from its source in the province of Shensi, in the mountains forming the provincial boundary between the province of Szechuan and Shensi as well as the water shed between the Han river and both the Yellow and Yangtze river systems, these mountains surround a large plain, known sometimes as the Han Chung plain. For about fifty miles, the Han river flows through this plain. Then it enters into a mountainous district of about three hundred and fifty miles long. In this mountainous district, the bed of the river is rocky. The channel is narrow, obstructed by numerous bad rapids, and, at some stretches, confined by gorges. From the neighborhood of the town Yun Yang, which is about half-way between the source and the mouth of this river, the country downwards become less hilly. The country of the lower half of the Han river is generally flat. Being almost entirely of an alluvial nature, it differs entirely in characteristics from the upper portion of the Han river.

From its source to the town of Siang Yang, a distance of about six hundred miles, the general direction of the river is easterly. Then it flows in a general south-easterly direction for a distance of about one hundred and fifty miles, to the village Tsuk Kow, in the neighborhood of Chin Chiang Hsien. From this point to its mouth, at Hankow (meaning the mouth of Han), the general direction of the river is again easterly. The total length of this river is approximately nine hundred miles, draining an area of approximately sixty thousand square miles.

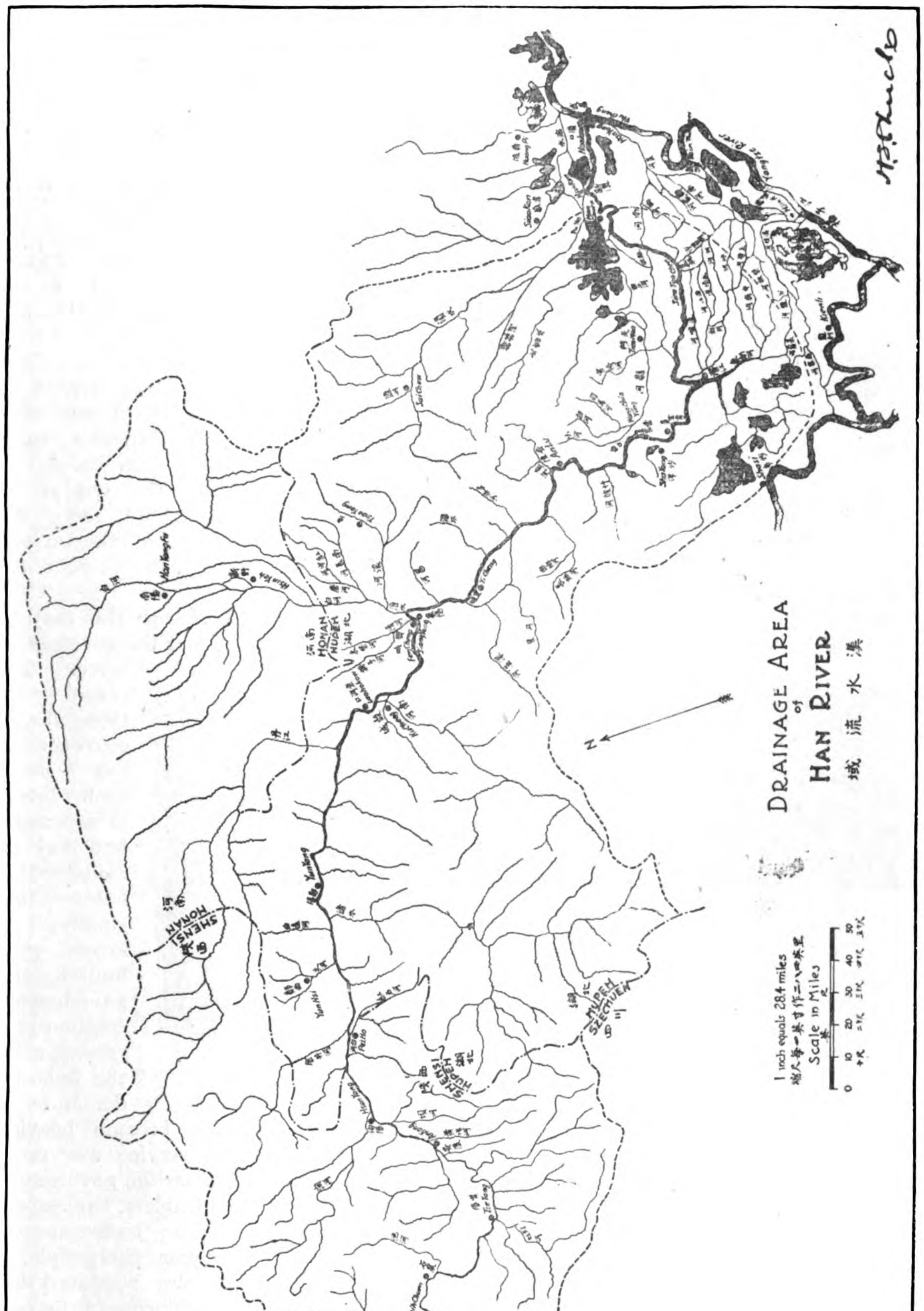
The principal tributaries of the Han river are: the Fu Ho joining the Han at Hsin Kow, the Pei Ho and Tang Ho just below the town Fen Cheng, the Nan Ho joining the Han at Ku Cheng, the Tan Chiang about fifteen miles above Laohokow, the Tu Ho about ten miles above the town Yun Yang, the Hsun Ho joining the Han at Hsun Yang, and the Ta Pei Ho just above Han Chung. The special significance of three of the tributary systems is worth mentioning. The Tan Chiang, the Pei Ho and the Tang Ho drain a large territory in the province of Honan, and these rivers serve as some of the principal trade routes for the inland commerce between the provinces of Honan and Hupeh. The water of the Fu Ho not only flows into the Han river but also, through a series of lakes and creeks, into the Yangtze river by the Seven Mile Creek in the neighborhood of Shen Chia Chee.

Records show that the difference of water stages reaches twenty-five feet at Fen Cheng, twenty-seven feet at Sha Yang and thirty-one feet at Sien Tao Chen.



A break of the levee at Tsien Chia-wan during summer flood of 1921

This study chiefly concerns the lower part of the Han river. Therefore, the descriptions which follow are limited only to this section of the river, especially between the cities of Siang Yang and Hankow.



Drainage Area of the Han River

The Lower Han

The Lower Han is a silt-bearing river, flowing through a basin of alluvial and sand deposits. The belt of country which is subject to the overflow of this river varies in width from a couple of miles to about fifty miles. The deposits of this country are generally sand and clay or a mixture of these materials and occasionally gravel. The gravel deposits are generally found between the towns of Yi Cheng and Siang Yang.

The course of the Lower Han is characteristic of its kind, consisting of a series of bends of varying magnitude and curvatures, and straight stretches between the bends. The channels at the bends are generally more definite and much narrower than those of the straight stretches. At the bends, the deep water is always near the concave side of the bank. The channels are generally wider at the straight stretches. On this account, the velocity of the current in the straight stretches is generally slack, resulting in sedimentation, forming chutes, islands and bars. These are constantly washed away by the high water and formed again, thereby causing what is known as the "shifting bottom" of the river.

Between Siang Yang and Anlu, the river practically runs wild. Although there is a rather definite low water course, limited only by sand banks, the high water generally floods the lowlands for miles on either or both sides of the river. These lowlands are generally sandy and a few stretches are of gravel deposits. At some localities the land is clay. Wherever the land is of clay, it is generally high, sometimes above the ordinary high water level. The right bank between the towns Yi Cheng and Siang Yang is of this nature. The river bottom of this section of the river is most unstable. It shifts constantly even at the slightest fluctuation of water levels. This renders navigation on this part of the river very difficult and uncertain.

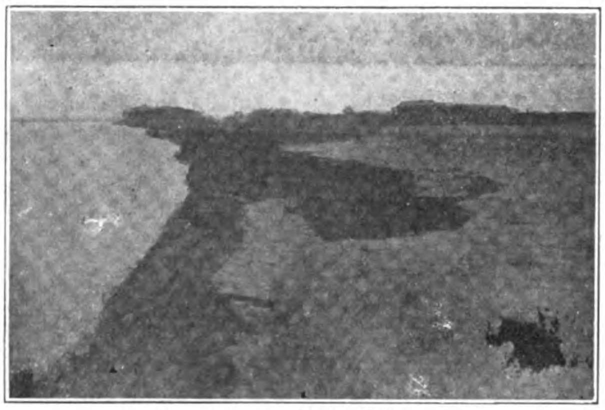
There are few ranges of low hills, some of which are located along the river bank and others, a few miles away. Wherever a range of hills is located on one side of and near to the river bank, the opposite side is always low flats, invariably of sand, stretching out for miles and subject to the overflow of the river even at average high water stage.

Chiefly on account of that the banks are mostly of clay, the channels of the section of the river between

Anlu and Hankow, with the exception of a short stretch near Sha Yang which is sandy, are more defined. The low water channel is fairly defined and regular and the high water is confined within limits with levees. During extreme high water stage, the lowlands behind the levees are sometimes twenty or thiry feet below the high water level. This is what accounts for the grave danger at the time of high water stage and the disasterous results in case of a break in the levee. The country made up by the districts, Shao Kan, Yin Cheng, Kin Shan, Tien Men and Han Chuen, is a large area of flat lowlands full of shallow lakes with a few sprinklings of low hills. The natural drainage of this area of lowlands is from Anlu south-eastwards towards Hsin Kow. Between Anlu and Hsin Kow, the Han river has practically no tributary to drain these lowlands. In fact, they are hemmed in by an almost continuous levee to prevent the overflow of the Han. The only outlet of this large drainage area is the Fu Ho, located at Hsin Kow. A glance at the map will show the readers immediately, the disaster which may be brought to this large tract of land in the case of a break in any portion of the levee between Anlu and Wong Chia Ying.

Method of earth tamping in levee construction at Tsien Chia-wan. A stone about 70-lbs. in weight is lifted and let fall on the loose earth

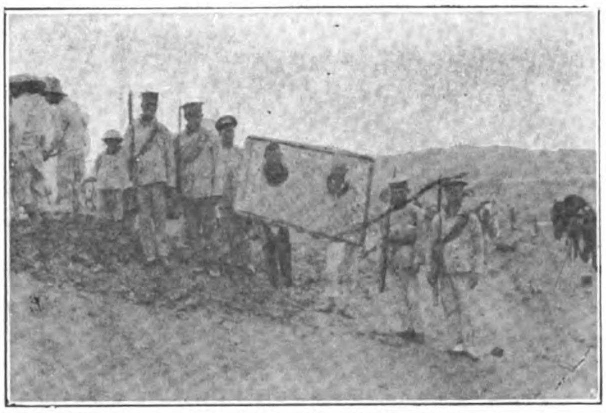
Han Chuen district, being the lowest and located at the immediate outlet of the flood water always suffers the heaviest. The successive breaks of the levee at Wong Chia Ying during the summers of 1919 and 1921 had brought untold sufferings to these districts, and Han Cheun, the greatest.



Bank caving near Tsien Chia-wan

The mouth of the Han river where it empties into the Yangtze is too small to take care of the water of the river during high water stages. In time of freshet, the current of the water at this locality sometimes develops to such a high velocity that it is extremely dangerous for navigation of small crafts. On account of the commercial domination of the land near the mouth of this river, it may be financially impossible to widen this part of the river. On this account, a relief canal may be helpful. A proper survey will show immediately the feasibility of such a scheme.

At present, the Han river has another outlet into the Yangtze river through the Tung Kin Ho by the way of Chin Chiang district. This outlet connects the Han river at the village Tsuk Kow and the Yangtze at Ching Tan Kow about 180 *li* below Hsin Tee. Another possible location for a relief canal is through the series of lakes and canals west of the city of Hankow, connecting the Han river at Hsin Kow and the Yangtze by the Seven Mile Creek in the neighborhood of Sher Chia Chee.

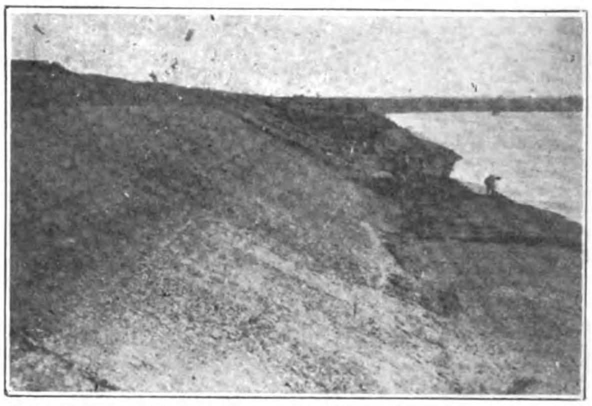


Method of punishing offenders in levee construction

Levees

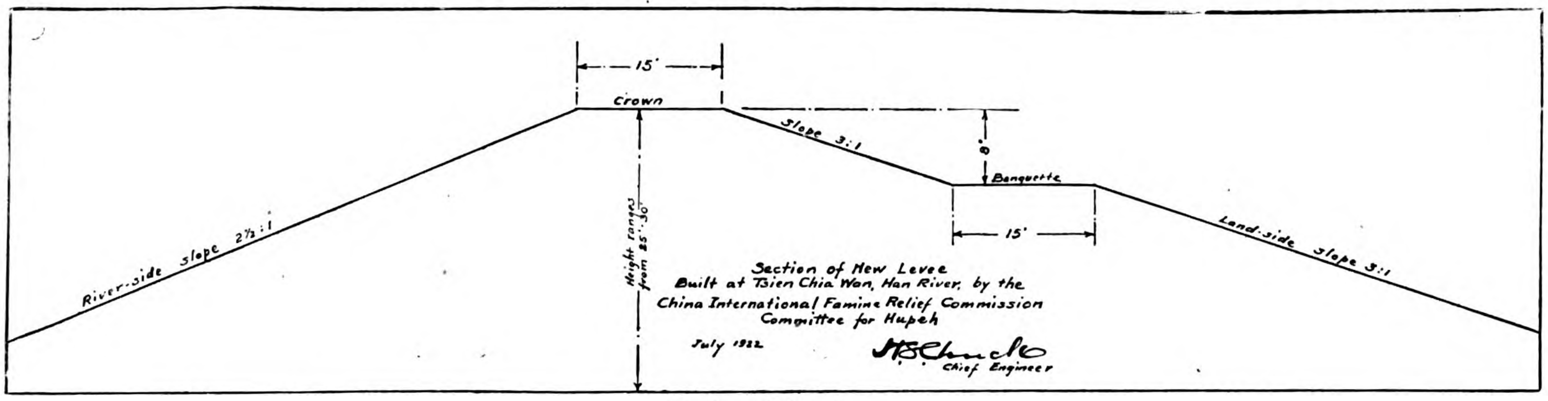
Levee is a common name given to the system of earth embankments built along the sides of any river of alluvial character for the purpose of preventing inundation of the lowlands situated on the sides of the river. Some of the most notable levee systems of the world are those of the Po river in the northern part of Italy and the Lower Mississippi of the United States. Such a system of levees, although not so scientifically well built and maintained, is found along both sides of the Lower Han river. As having been noted, the Lower Han flows through an alluvial plain, varying in width from a few miles to about fifty miles. The system of levees is, therefore, to serve the same purpose as those of the Po and Mississippi; namely, to protect the lowlands from inundation.

According to ownership, the levees of the Lower Han may be classified into two classes: the people's levee and the government levee. The cause of these classes of ownership has never been clear in my mind but may be explained as follows: Originally, all levees were built by the government. As time progressed, when the financial demand of other sources, not necessarily more worthy, became heavier, the ability of the government to do public service was much curtailed. During such time of emergency, when the government was thus rendered helpless, the responsibility of levee repairs and construction naturally fell upon the people.



Low water bank properly sloped for revetment; near Tsien Chia-wan

In general, it may be stated that there are two main objects in the construction of levees: first, to confine the flood water of the river within a certain channel, and, secondly, to protect the farm land on both sides of the river from inundation. To serve these two purposes, it may be said off-hand that the best system of levee that can be built is to follow closely to the river bank. This view may be accepted as sound and wise if the river should keep to its banks constantly. But this is impossible in nature. Banks are constantly eroded and the river constantly changes its course. On this account, levees are generally located at some distance from the river bank. The rapidity or the rate of erosion of the bank in front of the levee is a large determining factor upon the question



Section of New Levee

of levee location. A rapidly caving bank, especially along the concave bend of the river, shortens the life of the levee back of it, unless the bank is properly and strongly reveted. All other points being favorable, the economic consideration of the location of a levee to be built between two points is to follow the curve of the river thereby increasing the length and cost of the levee but enclosing and protecting more land or to build it in a straight line there—reducing the length and cost of the levee and leaving some land unprotected. All these questions require thorough study into the local conditions and behavior of the river as well as experience. It is generally accepted by best authorities on levee location that any levee having a life of twenty or thirty years is wisely and economically located.

Chiefly due to the lack of unanimity in action or the lack of central control, the types and cross section of the levee built in the different districts along the Han river vary. The crown width varies from ten to thirty feet and the side slope from 1 to 1 (1 foot horizontal to 1 foot vertical) to 3 to 1 (3 feet horizontal to 1 foot vertical). The slope generally used is $2\frac{1}{2}$ to 1 ($2\frac{1}{2}$ feet horizontal to 1 foot vertical).

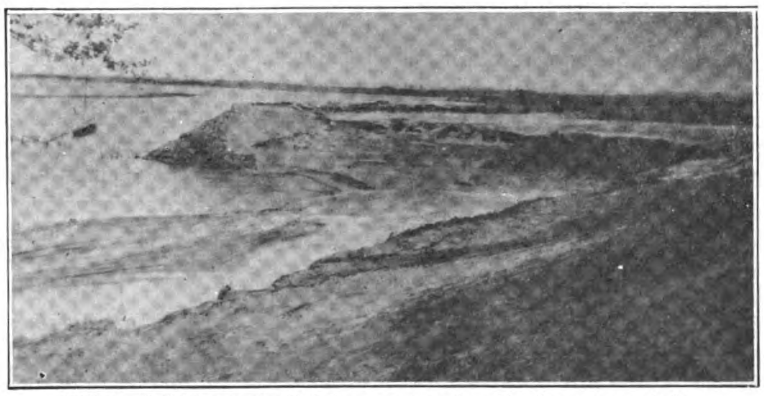
Animal about size of an ordinary dog, very common at Tsien Chia-wan, which bores into and lives inside the levee

On account of the shortness of time when I was connected with the works of this river, it is rather too soon for me to say just what is the best and most economical section to be used for this river. The adoption of an economical section requires some time for the study of the local conditions, behavior of the existing levees and the soil. No doubt, the most economical section is one that involves the smallest amount of earthwork (cheapest) and will resist the hydraulic forces of the river with the greatest efficiency. I have, however, an opportunity to try out one section at Tsien Chia Wan. This new section differs from all the existing sections at present used along the Han river, the new feature being the introduction of a banquette of fifteen feet wide of the land-side of the levee. This section has a crown width of fifteen feet, a river-side slope of $2\frac{1}{2}$ to 1 ($2\frac{1}{2}$ feet horizontal to 1 foot vertical) and aland-side slope of 3 to 1 (3 feet horizontal to 1 foot vertical). The banquette is 8 feet below the crown.

I have noticed that chiefly due to an improper knowledge of the behavior of the hydraulic forces of the river, some very abrupt points, like the bankheads, were built out from the levees which were located near to or at the low water bank, extending into the river from ten or twenty feet to about a hundred feet. These bankheads were constructed with earth and strongly protected with rock facings and sometimes with pile foundations. The local name for these bankheads is "chee tow." The bank immediately above and below the "chee tow" is sometimes protected with stone masonry but most times not. The popular opinion of the "chee tow" is that it will deflect the current of the river to the opposite bank, thereby protecting the bank on the same side and below the "chee tow." This idea of the protecting power of the "chee tow" is certainly erroneous. The effect of the "chee tow" is exactly the same that of a "false point." The tendency is the development of an eddy current on the down-stream side of the "chee tow" thereby causing the bank below it to be eroded. The effect of the "chee tow" is therefore exactly the opposite to the local popular conception. A very good proof of this erroneous conception of the protecting power of the "chee tow" is seen at Sze Tze Kow (see illustration below) where the levee, forming the river bank below the "chee tow," being unprotected, has about half of its section eroded away during the flood of 1921, almost causing a catastrophe.

The levees of the Han river are built with clay or a combination of sand and clay. At some localities, where the deposits are all sandy, earth is transported from a distance, sometimes as far as a couple of miles. Levees along sand banks, where earth is scarce, are generally built with a sand core with earth facing on both sides. This method is adopted chiefly due to the difficulty and high cost of getting earth from a distance. When such practice is resorted to, the levee should be built with the greatest care so that the sand is properly weighed down with good earth both sides.

It is absolutely essential to use good earth in the construction of all important levees, even if the earth has to be transported from a distance. The first cost of the levee may be high, but it is a good insurance of safety against possible catastrophe. When good earth can be obtained from both sides of the river, it is better to obtain all the necessary earth from the river-side of the levee, starting the excavation at least a hundred feet from the toe of the levee and sloping the excavated land towards the river. If earth on the river-side is insufficient, it may be obtained from the land-side. Before starting work on the levee, the ground should be first prepared by



Effect of "false point" (chee tow) at Sze Tze-kow near Anlu: looking up stream

clearing off all old logs and stumps. Sometimes, the ground is covered with a scum and full of cracks due to the shrinkage of the mud brought up by the river. When such condition exists, the scum or the top layer of earth must be first removed and the ground excavated down to the bottom of the cracks. The foundation must be tamped hard before the first layer of earth is placed. The earth is placed in layers usually about a foot thick and each layer is tamped hard before the next layer is placed. Some engineers recommend that a ditch, the " muck ditch " about five feet deep and about five feet wide, should be dug along the centre line of the levee and built up again with good earth. The purpose of the ditch is to ascertain whether there is any logs or tree stumps or other rottable matters in the foundation. Although this is not quite necessary, it is a good practice. If the site should show any suspicion as to the presence of logs or rottable matters, this precaution should certainly be taken. If a " muck ditch " is dug, it should be again filled with good earth in layers and tamped hard as in levee construction.

The river-side of the levee should always be protected by sodding or facing with rocks. This is to prevent any possible erosion during the high water stage and sloughing due to heavy rain during the low water stage. Rock facing is very expensive. Sodding with good grass is almost an effective a protection, unless the levee is located near the river bank and along the concave side of the river. In such case, rock facing should be used. There is a popular opinion that trees planted on a levee offer a sort of protection with their roots holding the soil together. Only to a certain extent this is true. But the slight beneficial effect is entirely obliterated by the possible danger which they may cause. During high water season, the levee is more or less saturated and the earth of the levee is softened. Any high wind during the high water season may easily blow down the trees with their roots thereby endangering the safety of the levee.

Although there are inspectors paid by the government, under the control of the Hupeh conservancy bureau, and stationed at different sections of the levee along the Han river, the duties of both the conservancy bureau and the inspectors have been so neglected that there is practically no central control. On account of this negligence in duty, these inspectors have practically no definite responsibility. Besides drawing their monthly wages, they do not seem to have anything to do. Moreover, the presence of some of these inspectors is sometimes a source of danger. Some of these inspectors are treacherous characters. Living constantly in an idle state, they are ever looking forward for a break in some part of the levee. A break of the levee is a god-sent chance to them. I was told that some of the most treacherous characters even would go so far as to cause a break by some underhand scheme. This necessitates work ; and work, of course, means extra money, irrespective as to whether it is rightfully or wrongfully gained. I do not by any means desire to condemn all the officers and inspectors who are connected with the levee works. Many of them are absolutely conscientious and honorable characters. I have come in contact with several men, in connection with my works on the Han, who gave their whole time gratis or at a very low salary to superintend levee repair and construction with absolutely no other motive than philanthropic.

It is a pity that it seems to be the characteristics of the Chinese people in general to neglect the maintenance of any structure after it is constructed. The maintenance or rather the lack of maintenance of the levees of the Han river is a good example. After the levee is constructed, no thought is given to its maintenance until the structure deteriorates into such a condition so as to endanger the safety of the whole structure itself before any attention is given to it. Sometime they even have the patience to wait until the total failure of the structure before anything is done to it. They are then forced by circumstances to replace the entire structure with a new one after much damage is done by its failure.

Besides the total lack of maintenance, there are many abuses which I have noticed along the different sections of the levees. These abuses are: cultivation along the slope of the levee, excavating earth from the slope of the levee to add to its height, rooting grass for fuel on the slope of the levee by the poor farmers, burrowing holes into the levee by hogs and other animals. The last is not abuse by human hand. But since it is not being looked after by the inspectors, it may be termed so indirectly. All these abuses tend to loosen the soil of the levee thereby increasing the chances of sloughing, saturation and even failure.

As a suggested scheme for the maintenance of the levee system, I offer this plan. All the levees should be placed under the government control, and the work divided into sections. Each section is to be placed under the responsible charge of an officer to be known as the district officer or engineer. All these district officers are held responsible to a central office located at Hankow or Wuchang, under the charge of a chief officer or engineer. It goes without saying that this chief officer must be an experienced and conscientious engineer. A gang of proper size is stationed at each section to take of all repairs during the low water season. During the high water season, a very strict watch should be kept on the behavior of the levee and the gangs should be held ever ready to cope with any possible emergency. It should be the duty of each district officer to patrol his district at least once a day. The duty of these section gangs, besides keeping the levee in repair, is to watch the levee from all possible abuses. A proper scheme for the finance of levee repair and maintenance is not difficult. I understand that there is a steady revenue which amounts to no small figures from various *likin* stations annually specially devoted to this purpose. But this fund has always been misappropriated. Besides, I was also informed that there is an annual conservancy tax paid in to the government regularly by the different districts in the Han river valley, and this fund is supposedly devoted to levee repairs and construction. This fund, I understand, also amounts to no small figures. The difficulty seems to lie not on the finance itself but rather in its proper appropriation.

Levees may fail through three sources: (1) Overtopped by flood water; (2) sloughing; (3) flow through a crevice developed the levee.

Failure due to the first cause is very uncommon. Levees are generally constructed with sufficient height to take care of ordinary high water. But cases have happened every hundred years or so when certain sections of levees have been overtopped by abnormal flood. When a levee is overtopped by flood water, it takes but very little time for the inrush of water to develop a gap which soon enlarges sometimes to a length of two or three miles. With a proper maintenance gang, catastrophe due to this cause may be avoided by the careful watch and quick action of the gang. When the water comes to within a dangerous height of the levee, a fortress of sandbags should be placed immediately on top the embankment. These sandbags raise the height of the levee and sometimes are quite effective in averting a disaster. This necessitates the keeping on hand of a good stock of sandbags at all important sections of the levee.

Sloughing is due primarily to seepage through the body of the levee. All levees are built with earth and are therefore not absolutely impervious. They all seep more or less, and the amount of seepage depends upon the cross section of the levee, the quality of materials with which the levee is built, and the solidity of construction.

During high water stage, the earth of the levee is more or less saturated and the line of saturation dips downwards from the high water level on the river-side towards the toe of the levee on the land-side. If the cross section is too small, combined with poor materials or improper construction or both, seepage may develop. Such seepage tends to develop sloughs on the land-side of the levee. When any seepage is developed and the seepage water is not properly drained off immediately, the water flowing through the sloughs will bring along with it, earth from the levee, thereby endangering its safety. When a levee begins to seep, the seepage water should be drained off immediately to prevent sloughing. A very effective method which had been very successfully used on the Mississippi, is to cover the whole seepage area with a layer of brushwood, care-

fully weighed down with rocks. Care should be taken in not using too much rocks to overweigh the brushwood. The chief idea of the brushwood is not to try to force the seepage water to flow through it but rather to let the water to flow under it, and the brushwood acts as a sort of impediment to retain or hold back the earth which tends to flow with the water.

Sometimes the seepage water develops into a little stream, bringing along with it, sand and clay from the interior of the levee. When such condition occurs, it should be looked after more carefully. This method has been successfully used in some localities of the Mississippi river, is to build a pond around the seep hole on the land-side of the levee with sandbags, not allowing the water to flow down the slope. The water collected in this pond develops a back hydraulic pressure and may stop the flow. But the ingress must be located. Sandbags, and earth if the current is not too strong, must be thrown into the water at the locality of the ingress to try to stop the water from flowing. Large seepage holes may develop into a crevice.

Crevice may be developed in the levee by the enlargement of seepage holes, logs or other matters rotted in the levee. The only possible method in trying to stop the flow of water through a crevice after it is developed is by the method just described in the last paragraph. But this even seldom attain any success. Many engineers recommend that after the water had gained a certain headway, in the crevice, no attempt should be made to close it, as such attempt invariably proves to be futile.

In connection with levee failures, due to crevice, it is interesting to cite an incident which happened on the levee failure at Tsien Chia Wan, a village about thirty *li* below Sha Yang, during the flood of 1921. A farmer just behind the levee, desiring to have some water for his crop, dug a little channel on top the levee. He expected to draw just sufficient water from the river through this channel and then dam it back again. But unfortunately, the water rose on him suddenly and soon got beyond his control. The channel begun to widen rapidly, and, within a few hours, the whole levee gave away, developing a break of about a thousand feet long.

Macao's Big Harbor Improvement Scheme

Dutch Firm Secures the Contract

A BEGINNING is about to be made with the long-discussed harbor project at Macao. According to the " Hongkong Daily Press " a considerable portion of the work is to be put in hand within the next few months, the tender of the Netherlands Harbor Works Co. having just been accepted, at roughly six-and-a-half million dollars, subject to certain conditions and reservations with respect to unforeseen circumstances that may arise, e.g., typhoon damage during the progress of the work.

Three great firms were in the running for this important contract: Sir Whitworth Armstrong, Ltd., Newcastle; the Pacific Construction Co., Vancouver, B.C.; and the Netherlands Harbor Works Co., Amsterdam, whose agents are the Holland-China Trading Co. Tenders were to be sent in by April 18 of this year, but at the request of one of the tenderers an extension of a month was granted and finally another extension to June 20. On that day two tenders were handed in at Macao to the Jury. The Pacific Construction Co., notified that they could not submit full specifications in the time.

The Dutch Tender

The tender of the Netherlands Harbor Works Company has been found the more advantageous of the two, and terms were finally arranged between the Macao government and Mr. Van Exter, the Company's representative. Certain reservations are made in respect of circumstances beyond the control of the contractors. These problems will be dealt with as and when they arise and it may be that, if unforeseen difficulties are unexpectedly numerous, the scheme will be modified in some respects in order to keep within the sum of seven million dollars or so that the Macao government has in hand for this work.

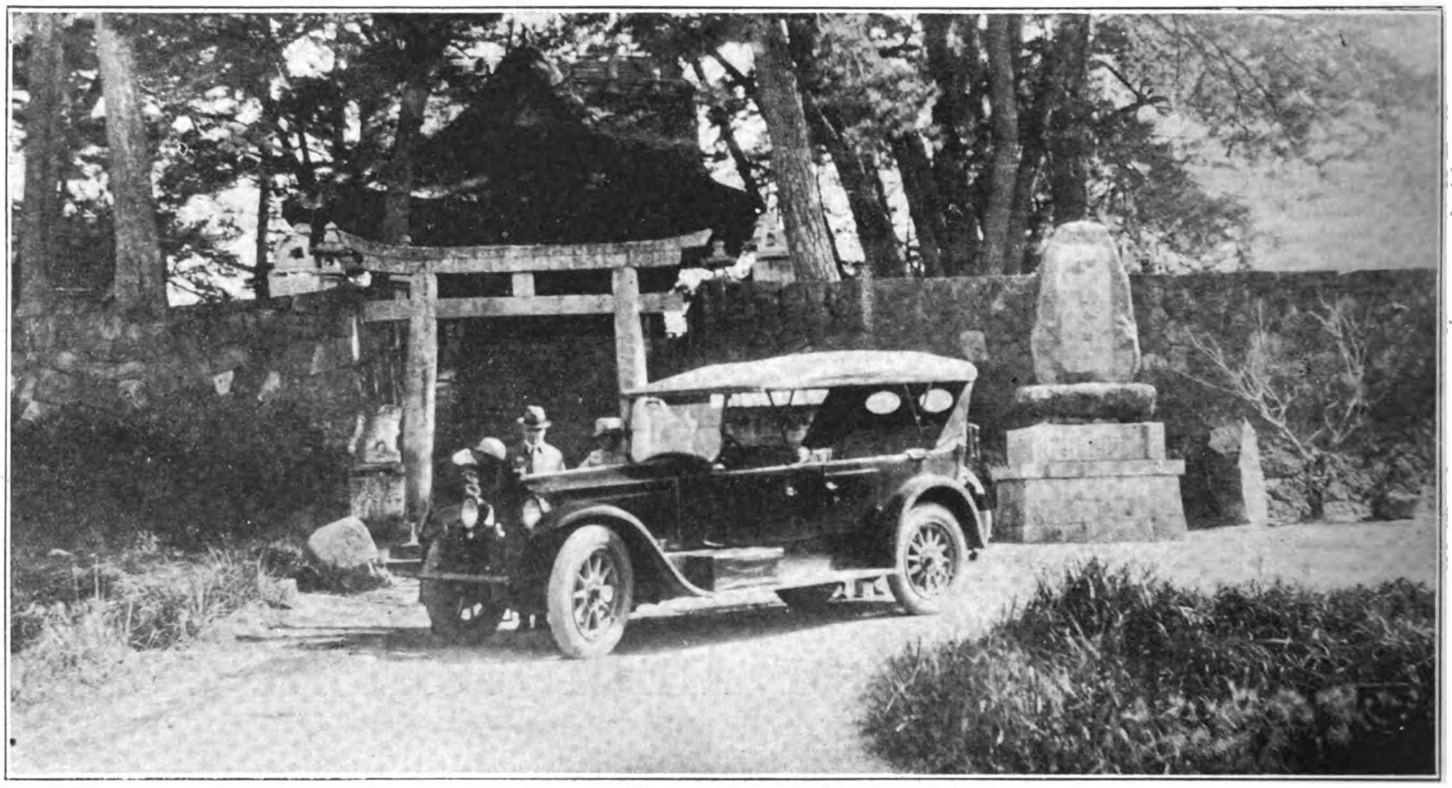
The Netherlands Harbor Works Co. completed in 1921 the Chefoo Harbor Works improvement scheme at a cost of four-and-a-half million dollars. Besides bringing to Macao from Chefoo the extensive plant used there, the Company will bring from Europe a number of powerful dredgers and towboats, in order to expedite the work as much as possible. Operations will begin in about four months' time and it is estimated that the work will occupy three years.

The most recent proposals for the Macao harbor improvements were estimated to cost between $15,000,000 and $20,000,000. It was proposed to make extensive reclamations in front of the Praya Grande and in the junk harbor near the Green Island Cement Works: also to cut a canal connecting the inner harbor with the Canton river and a channel to deep water and to construct an " artificial port " by building two sea walls and a breakwater.

The scheme now to be carried out comprises a reclamation extending approximately from the corner of the Praya Grande, known as the San Francisco Battery, to point known as Macao Siak. On this reclamation, ultimately, offices and godowns will be built. Projecting from the reclamation, the contractors are required to build two sea walls and a breakwater enclosing a water area partly dredged to 21 feet l.w.s. (low-water at spring tides). It will also be possible to build out piers from the inner side of the walls and so give further facilities for handling cargo from this "artificial port," as it is called, the contract provides that a channel is to be dredged to the deep water channel—a distance of approximately three miles. The channel will be about 100 feet wide at the bottom, and 21 feet deep. The Macao government's estimate of the cost of the reclamation, the " artificial port " and the three mile channel was about four-and-a-half million dollars, but the lowest tender—that of the Netherlands Co.—was higher than that sum by two million dollars.

The plans of the work, on which the tenderers prepared their estimates, were prepared by Admiral Hugo de Lacerda, the director of the port of Macao, who has been working on the project for several years. Admiral de Lacerda planned and superintended the important harbor works at Laurenco Marques.

The Imperial Steel Works at Yawata, Japan, has completed construction of its plant for making tin plate. This plant was erected with a view to checking imports of tin plate from America. Its estimated annual capacity is 20,000 tons, although, Commercial Attaché James F. Abbott reports from Tokyo, the first year's production is not expected to exceed 6,000 tons.



A Packard Twin-Six at a Wayside Temple in Japan

The Passenger Car Market in Japan

Interview with Mr. William I. Irvine, U.S. Trade Commissioner

MR. WILLIAM I. IRVINE, the automotive expert of the U.S. department of commerce, has completed an exhaustive survey of the Japanese and Chinese markets for automobiles and trucks. Portions of his comprehensive report have been released and published in many American newspapers attracting unusual attention for the mass of new and accurate detailed information which has enabled American manufacturers to gather an intelligent idea of the needs and possibilities of this promising market. Of special interest and trade value are his findings on the present and future possibilities of the passenger car market in Japan where it was expected that with the recovery of European industry after the war that an attempt would be made by the automotive manufacturers to re-enter the markets in which their cars had met with favor in the past. "Many predictions were made," says Mr. Irvine, "that the hold which America had secured on the Japanese market would be seriously weakened as the Japanese had a decided preference for European cars and only bought American vehicles of necessity. These predictions have fallen far short of realization as yet. The losses which American cars have sustained have only to a small degree been the result of vigorous competition the gains by European manufacturers have been due to the fortuitous circumstance of a tax levy which operates against American cars. And as to whether these gains will continue there is doubt even in the minds of the sellers of European vehicles. In numbers of cars imported into Japan, America has always led and but once has taken second place in value and so in view of the wide familiarity it is safe to make the prediction that American cars will always hold first place, providing manufacturers cultivate the market. In this opinion the majority of Japanese dealers concur.

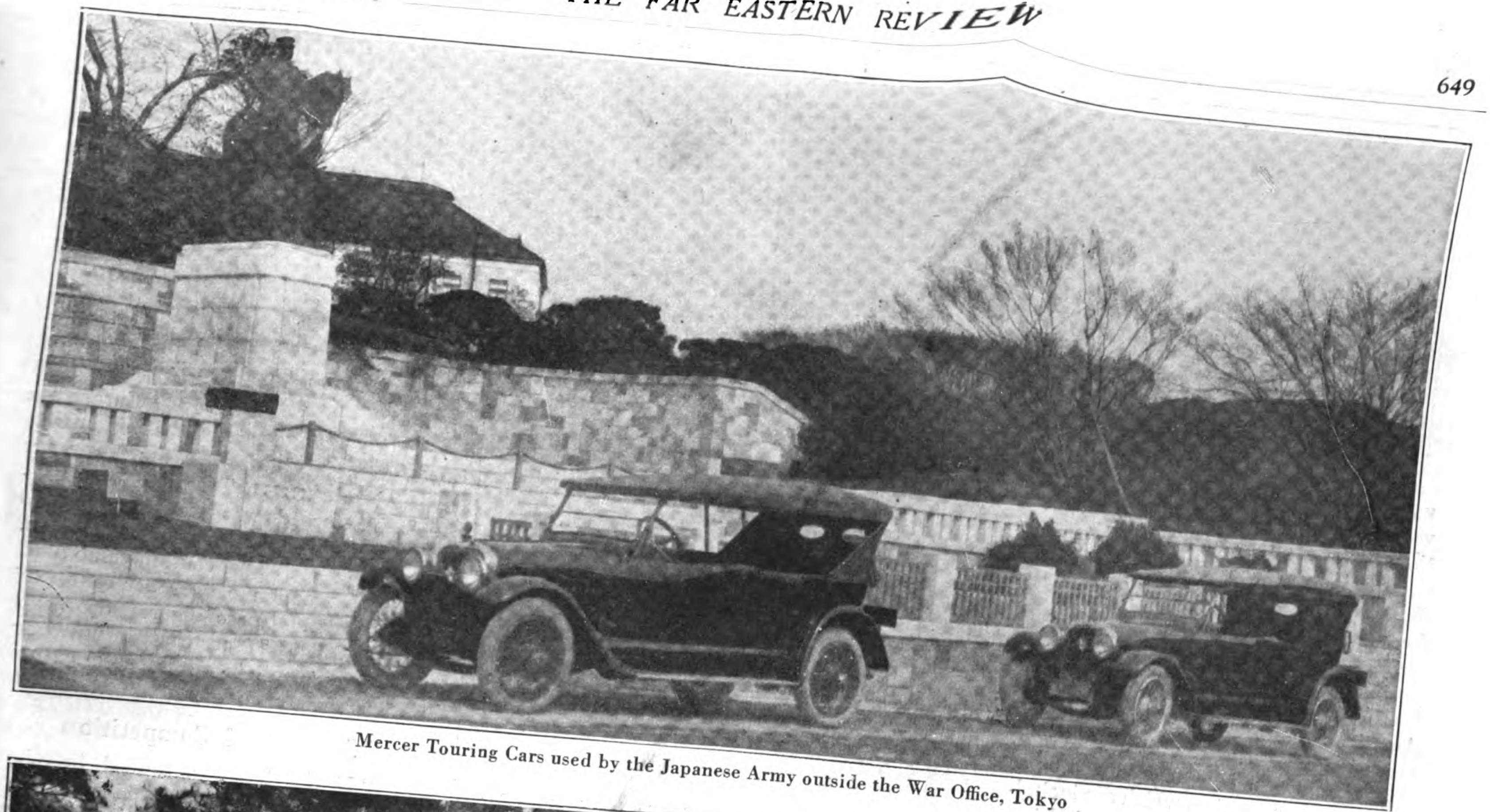
"The relative importance of the contenders for the Japanese market are shown by the following table of imports of motor cars published in the 'Annual Return of the Foreign Trade of the Empire of Japan.' Values given are in Yen (1 yen=.4985).

Countries			United States	Great Britan	France	Italy	Germany	Others
Year	Number and Value							
1912*	Value	...	505,377	218,697	42,566	57,166	62,436	6,704
1913*	Value	...	487,325	257,098	64,670	108,409	187,381	—
1914	Number	...	37	20	2	15	17	3
,,	Value	...	60,297	64,059	8,765	56,977	40,223	10,289
1915	Number	...	22	5	1	2	—	—
,,	Value	...	30,481	19,910	3,096	9,100	—	—
1916	Number	...	196	12	1	6	3	—
,,	Value	...	320,941	28,052	800	33,904	3,100	—
1917	Number	...	851	3	1	—	—	5
,,	Value	...	1,548,804	12,077	500	—	—	7,449
1918	Number	...	1,636	1	1	13	—	1
,,	Value	...	4,426,938	2,500	2,000	91,935	—	1,400
1919	Number	...	1,520	2	—	—	17	38
,,	Value	...	5,275,000	23,000	—	—	123,000	108,000
1920	Number	...	1,684	27	14	4	1	15
,,	Value	...	4,608,000	142,000	53,000	26,000	3,000	32,000
1921	Number	...	832	75	83	46	22	15
,,	Value	...	2,160,638	476,480	353,432	160,645	32,000	88,160

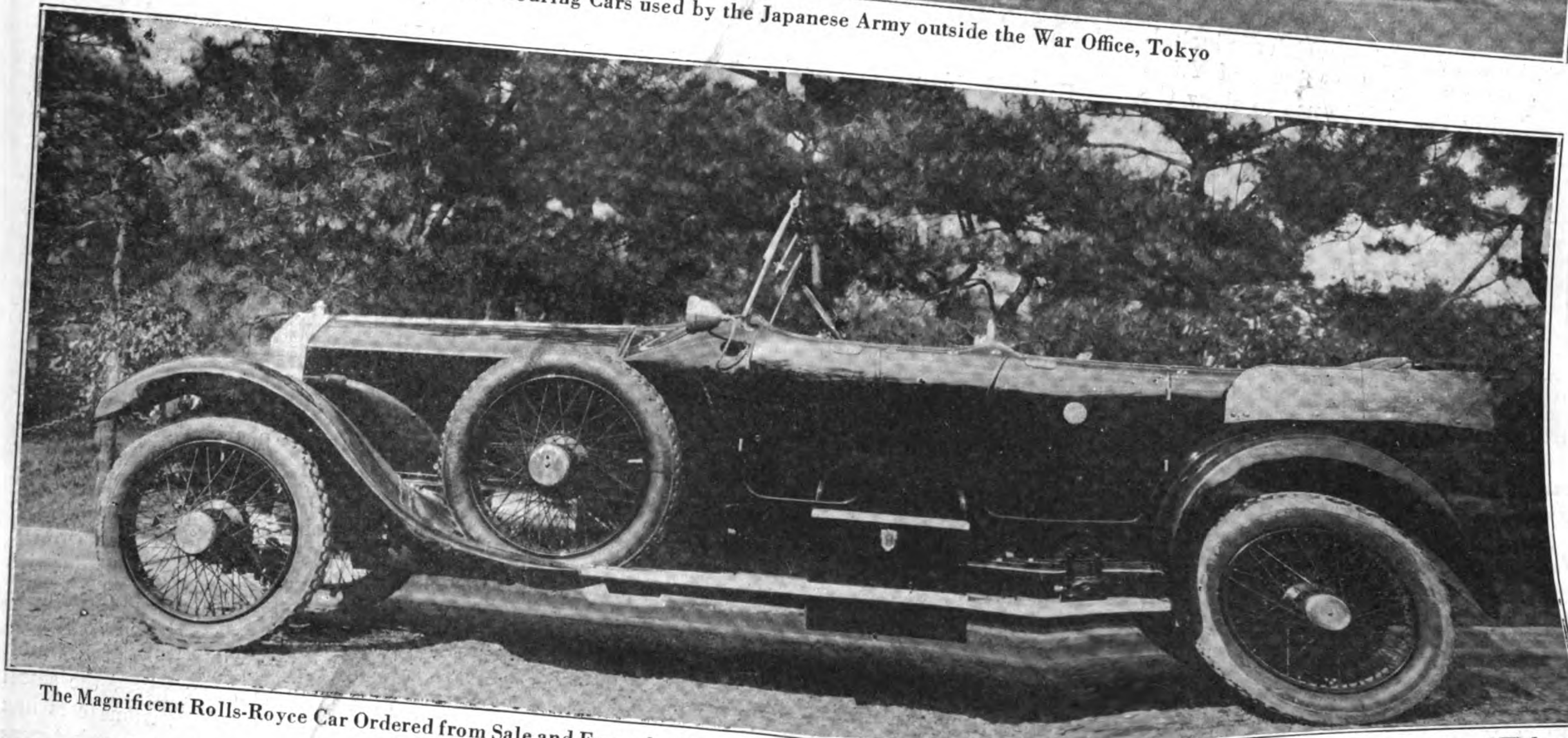
*Parts included.

"Cars and trucks are jointly classified in the Japanese customs returns so that to get a true picture of the number of cars imported from America the following allowances for truck imports must be made: 1916, 10 per cent.; 1917, 10 per cent.; 1918, 22 per cent.; 1919, 40 per cent.; 1920, 44 per cent. These percentages are derived from published figures of the numbers of cars and trucks exported from the United States to Japan. No allowance need be made for trucks from any of the other figures as practically all trucks in Japan are of American origin.

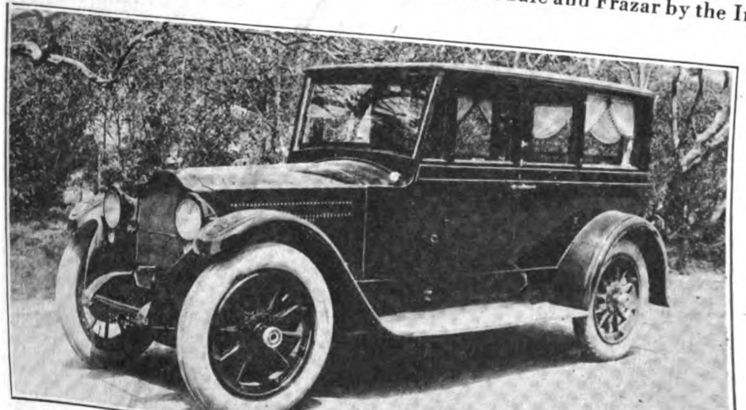
"But the true picture of the market cannot be gained without taking into consideration the imports of spare parts, for under this



Mercer Touring Cars used by the Japanese Army outside the War Office, Tokyo



The Magnificent Rolls-Royce Car Ordered from Sale and Frazar by the Imperial Household Department for the use of H. R. H. The Prince of Wales

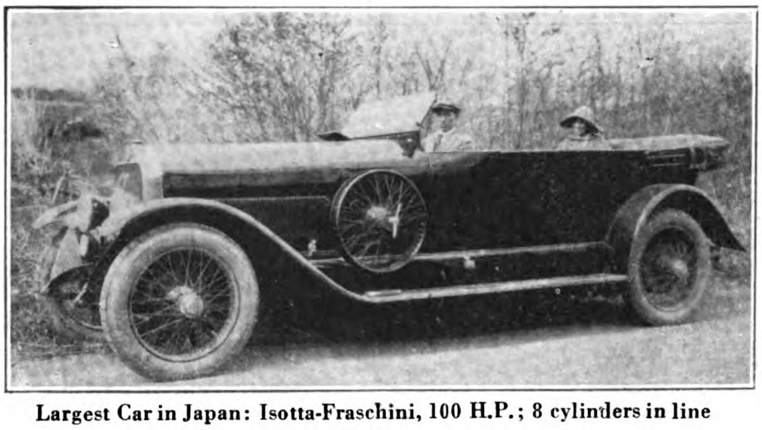


Packard Car bought by the Osaka Municipality for the use of H.R.H. The Prince of Wales

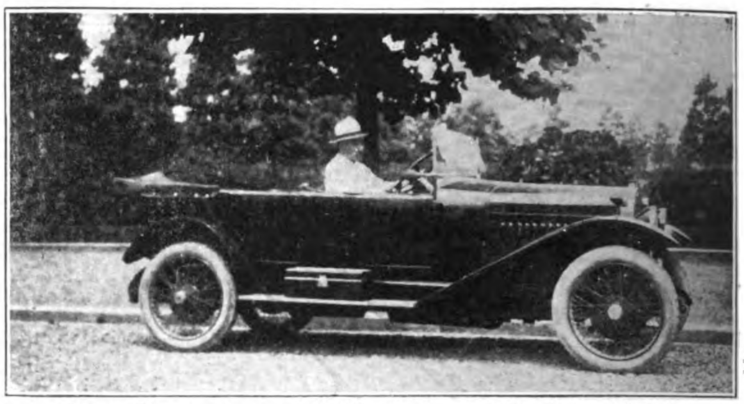
heading are entered hundreds of disassembled cars and trucks. The following figures of the imports of motor parts from 1914 to 1921 are from the same source. Values are in yen :

Countries / Year		United States	Great Britain	France	Italy	Germany	Others
1914 Value	...	140,495	31,962	30,945	31,822	23,745	533
1915 Value	...	37,263	13,710	11,945	24,738	5,287	26,234
1916 Value	...	380,705	18,820	9,362	17,388	—	416
1917 Value	...	1,084,009	—	11,000	—	—	—
1918 Value	...	3,134,000	—	1,000	—	—	—
1919 Value	...	5,568,000	—	22,000	155,000	—	4,000
1920 Value	...	5,453,000	83,000	35,000	12,000	7,000	18,000
1921 Value	...	4,037,376	438,150	139,481	87,827	44,681	34,061

" A definite idea of the number of cars represented by the imports of parts may be gained by using the figures of Y.2,550 as the unit value per car. From this deduct 550 as the approximate

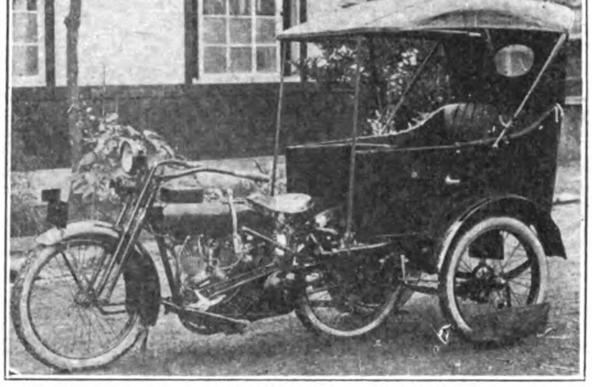


Largest Car in Japan: Isotta-Fraschini, 100 H.P.; 8 cylinders in line

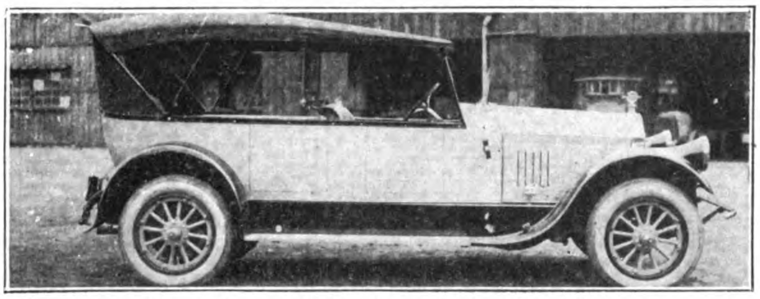


Delaya Touring Car, 4 wheel brakes, owned by Baron Shidehara

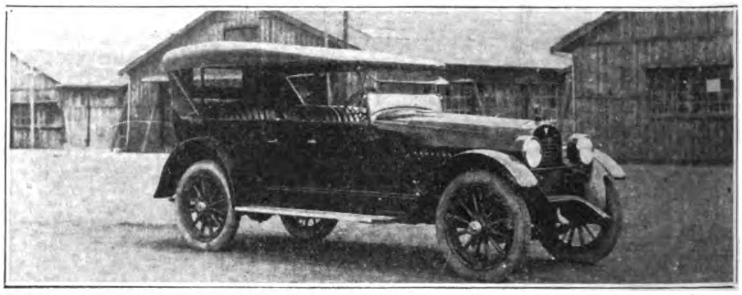
value of spare parts per car. The unit value is reached on the following calculation. The number of cars and trucks exported from the United States to Japan during 1920 was 4,029. The foregoing import tables show that the total value of cars and spare parts imported into Japan for the same period was Y.10,961,000. The division of the American number into Japanese value gives the approximate unit cost in yen, after the parts figures are reduced 6 per cent. to allow for tires which are included as spare parts. The figure of Y.550 is probably too high to use to show the value of spare parts imported for each



Harley Davidson with Rear Car Attached: Rear Car built at Nakano



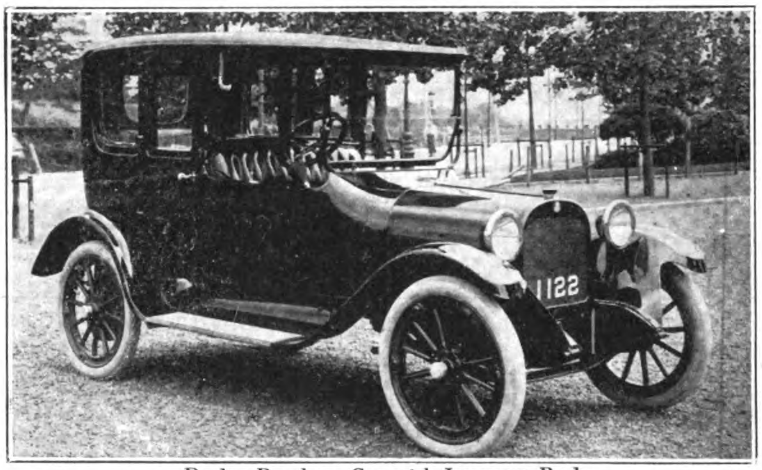
New Pierce-Arrow (1922): Japan Automobile Company



Hudson Touring Car

car, but it is suggested in order to give a more conservative figure.

"A comparison of the values of complete vehicles with spare parts shows that since 1919, the value of the latter has exceeded the former. Thus more than one-half of American automative vehicles are imported as spare parts which further proves that Japan is a greater chassis than a complete car market. The foregoing tables show that with but one exception America has lead in Japanese imports and that for the period from 1916 to 1921 it dominated absolutely the

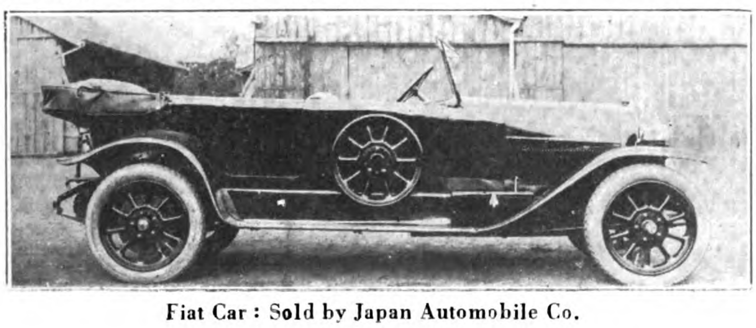


Dodge Brothers Car with Japanese Body

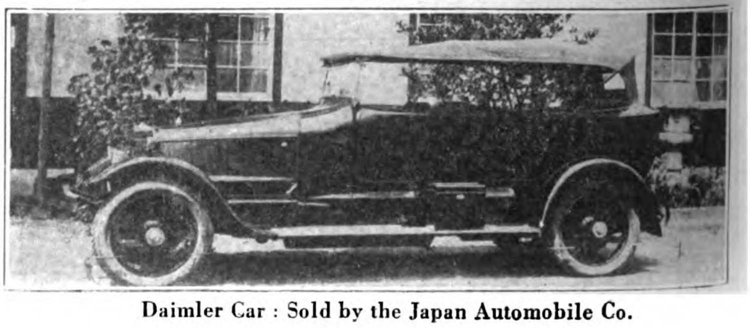
market. Beginning in 1920 European manufacturers re-entered the field but it was not until 1921 when the new tax went into affect in Tokyo that a preceptable inroad was made. In 1920 American car imports were 95 per cent. in number and 93 per cent. in value and within a fraction of 100 per cent. of spare parts. These figures dropped during 1921 to 77 per cent. in number and 66 per cent. in value of cars and 84.5 per cent. of spare parts.

"Sources of Competition

"If the losses sustained in the value of cars and parts combined Great Britain has gained a fraction less than 50 per cent. with France second and Italy third. In car numbers France leads Great Britain by eight. The relative position won by Great Britain will probably be held for its manufacturers are better represented than are either the French or Italian. The advantage which the Tokyo tax gives the small cylindrical dimensions cars has enabled British manufacturers with their light cars to establish themselves much more rapidly than they could have done had the past taxing policy been con-



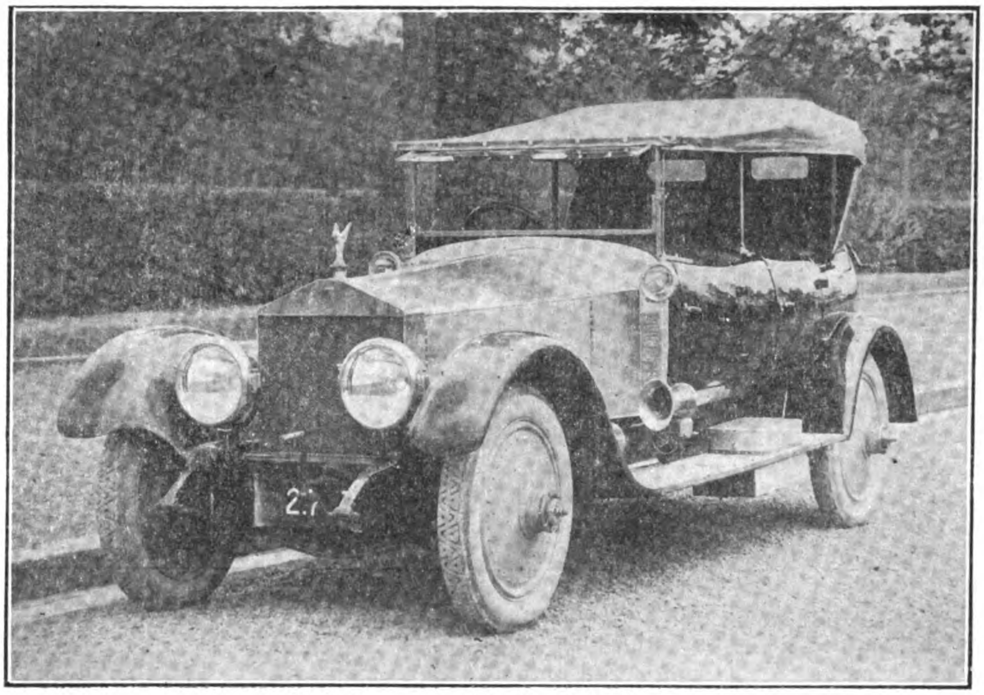
Fiat Car : Sold by Japan Automobile Co.



Daimler Car : Sold by the Japan Automobile Co.

tinued. This is demonstrated in cities outside of Tokyo where the small light car has yet to make any definite impression upon the market. The general run of European light cars average 10 to 15 horse-power under the Tokyo system of rating while American cars as a whole are rated at over 20. One American car which sells in the United States for less than $1,000 falls into the same tax class as the British Rolls-Royce, a perfect illustration of the inequality of the tax.

" Although as a group British manufacturers lead in competition against American, no single manufacturer has made a decided impression on the market. A few cars of each make have been imported but in the whole field the individual is lost sight of. It remains for an Italian car—Fiat—to head the list of European competitors of American cars. The small Model 501 has made a very favorable impression and has the good fortune to be in the hands of one of the soundest Japanese dealers with an organization not limited to Tokyo. This car falls into the 5 to 10 horse-power class and is reported to give 23 miles to the gallon of gasoline. Equipped with a 4-seated touring body it is quoted at Y.7,000 ($3,500), but it is alleged that there is no fixed price and that sales have been made well above and below this figure. Second in importance in number sold is the French Model Renault, 10 horse-power, followed by the Citron, also French, rated under 10 horse-power. The former with open 4 seat body is quoted at Y.7,500 ($3,750) while the latter is said to sell for Y.6,000 ($3,000). Other light cars which are being sold are the British Bean, 9.83 horse-power, closed body, Y.7,000 ($3,500): Wolseley, 10 horse-power, 4 seat, open body, Y.6,000 to Y.7,000 ($3,000 to $3,500): Mathis which is a French cycle car, selling for about $2,500. The following are represented and a few of each have been sold: DeDion (French), Humber (British), Bianca (Italian), Austin (British), Standard (British), and Rover (British).

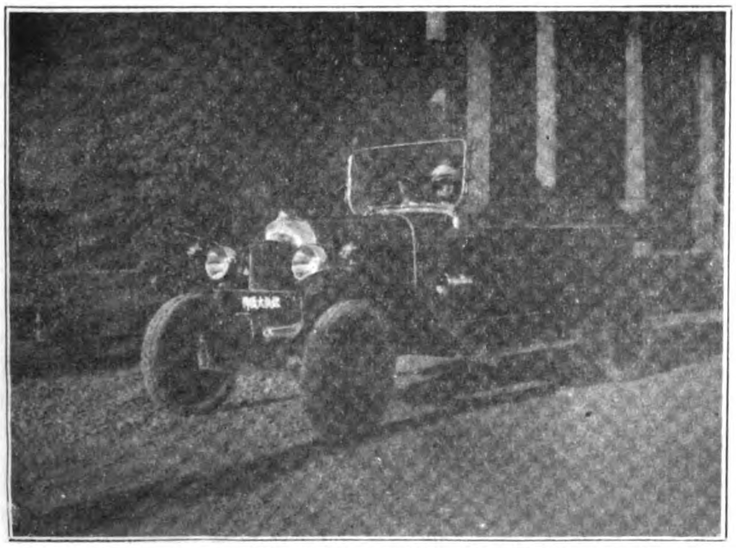


Rolls-Royce owned by Mr. E. H. Hunter

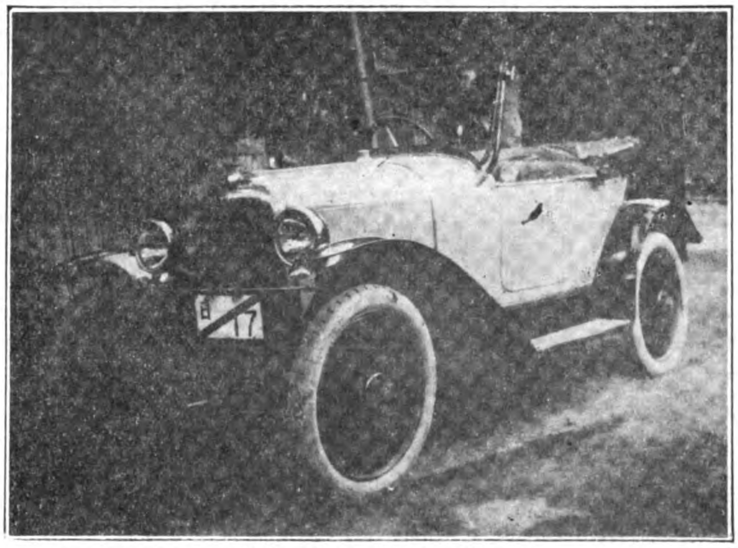
"The Advantages and Disadvantages of the Light Car

"The principal points in favor of light cars are small horse-power rating which gives it the advantage of a lower tax, economical gasoline consumption, long tire mileage and low mechanical maintenance costs. These are the arguments used in advertisements. Against this as counter claims are the comparatively high prices and the fact that these cars are not built to meet the severe operating conditions of Japan, which has been discovered by some of the first buyers of this type of car. The cars are designed primarily for use in the countries of their origin where there are excellent motor roads. The roads in Japan and especially in the streets of Tokyo are very different from European highways and it is doubtful if the cars will stand up for long. The opinion was expressed by an American service man who has had an opportunity to examine some cars after considerable use that in most of the small cars the rear springing, rear axe construction, and method of taking the power from the transmission shaft are inadequate for Japanese operating conditions. This opinion is borne out with several cars which have practically been dropped by their distributers because of the constant complaint of owners.

" Operating against the continued popularity of this type is the fact that open cars are not popular in Japan for the following reasons: owners will not ride in the same body with the chauffeur; the frequency of rains and the clouds of dust on dry days. (In passing it may be noted that the soil is very porous in Japan and only by constant sprinkling can the dust clouds be reduced. It is a common sight to see streets being sprinkled twenty four-hours

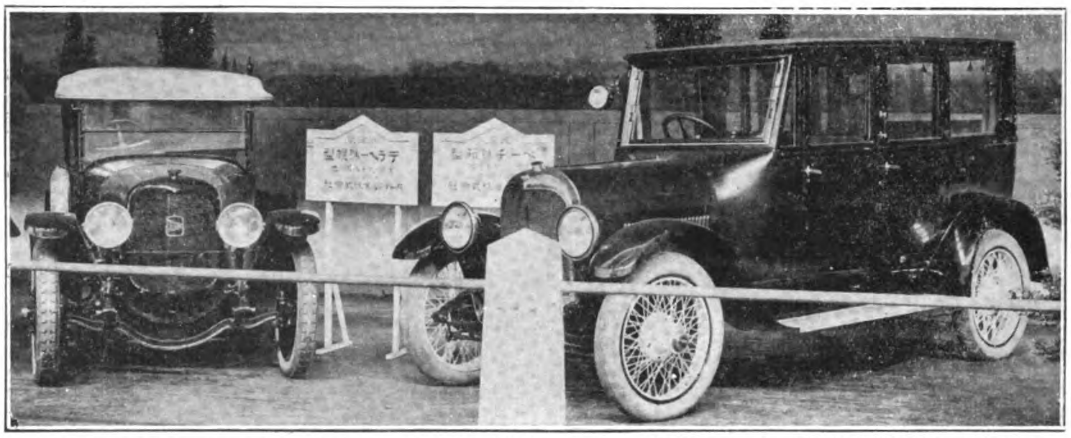


Citroen Torpedo, special de luxe, sold to Mr. P. Claudel, the French Ambassador



5 hp. Citroen—Two Seater

after rain). These conditions compel the use of an enclosed body. The European light cars are primarily designed as two-seat roadsters but this has not prevented their Japanese distributers from fitting them with heavy limousine bodies. It is questionable if these light cars can perform satisfactory for any length of time under constant overload. Unless these cars can be equipped with limousine bodies they cannot hold in the market. Motor cars are primarily designed for social purposes and protection must be given to gala costume and the uncovered heads of women for Japanese ladies never wear hats. The light construction of the car and the heavy bodies do not make for comfort. Dealers admit that complaints have been made that the cars jolt so badly that the elaborate coiffure of the ladies and high hats of the men have been ruined by coming in sharp contact with car roofs. It is not patriotism so felt that causes Americans in Tokyo to call first on the company that operates American cars in its taxi service when in need of cars.



Paige and Dela Haye Cars Exhibited at the Tokyo Pleace Exhibition by the Naigai Automobile Co., Ltd.

"Speed claims are made for all these light cars running anywhere from 35 to 50 miles an hour, but the opportunity to test them is rarely afforded because road conditions do not encourage touring. The advantages which American cars enjoy of acceleration and hill-climbing ability is not fully appreciated due to the absence of the owner-driver class. Chauffeurs do not appear to mind gear changing frequently but there is beginning to be complaints about the poor hill-climbing ability of the light cars and owners are noticing this. The average Japanese has considerable vanity and dealers have said that owners are not pleased when a car passes them on hills without difficulty.

"The *pros* and *cons* of the situation are being studied and not a few dealers are willing to predict that the popularity of light cars may be short lived, especially when economic conditions improve. The present business situation is such that the matter of taxes and operating costs receive disproportional consideration which will not continue with the return of prosperity, for the average owner in Japan is comparatively wealthy.

"Competition of High Price Cars

"The tax question has but slight bearing on cars that sell in Japan for $5,000 or over. The principal aid to the sale of European cars in this class is the belief entertained by many that European cars are superior to American. The majority of the European quality cars fall in the 15-20 horse-power group, but it is doubtful if buyers give much heed to this fact for practically every high-class car carries two men. The majority of these cars are represented by small dealers or by firms that are associated in other lines with British interests. European car agents are very enthusiastic about the cars they are receiving as compared with the rather apathetic attitude of the distributers of cars of similar class of American origin. The only reason which the latter offers for the frequency of European car sales is the prejudice which the Japanese have for things European and the fact that the imperial household department which buys about one-fourth of all quality cars has set an example which Japanese, very loyal to the throne, are following. It is doubtful if many of the recent buyers have purchased because they really decided between the mechanical qualifications and superiority of European and American cars. On the other hand the growing popularity of European quality cars may be due to the lack of attention which American manufacturers of high price cars give to the overseas market. Several high-grade cars are very poorly represented in Japan while the dealers of others seem to lack conviction regarding the merits of the cars in their charge. It appears as though American manufacturers may do some profitable educational work among their distributers.

"The European cars of this class are Rolls-Royce, Crossley, Armstrong-Sidley, Daimer, Sunbeam, Vauxhaul, all British: Renault, Delage, French: Fiat, Lancia, Isotata, Italian: Opel, Protus, German and the Austrian Diamler. Of these the best sellers are the British Daimler and the Renault followed by Fiat. With the exception of the Renault 12-18 model which sells for Y.12,000 ($6,000), the Model 505 Fiat, 15 horse-power which sells for Y.10,500 ($5,250) and the German cars which fluctuate almost from week to week from Y.9,000 ($4,500) to Y.12,000 ($6,000), the quality cars sell from Y.15,000 ($7,500) to Y.20,000($10,000.) The British Daimler is probably the most popular of the European cars.

"Dealers Attitude to European Cars

"In nearly every instance when dealers were asked why they had taken up European cars, especially the light models which sell at a higher average price than the average American, they replied that it was a matter of self-defense, necessary if they were to keep their organizations together. They maintained that they had to have something to sell and that the tax had practically cut the American business to less than one-half. Some declared that they did not want to handle European cars prefering to have all-American lines as it was confusing to do business with several nations because of the different methods employed and stated that if the taxes were considerably lessened they would discontinue their European light car connections for American cars were cheaper and when they could buy them at the reduced prices it would be difficult to sell European cars.

"It must be borne in mind that of the stock of about 750 cars unsold in Japan to which reference was made in the report on current business conditions in Japan as of April 4, 1922, that fully 80 per cent. were bought at the prevailing high prices of 1920. Not until these are disposed off will the disparity between European and American prices be fully shown.

"Summed up it would appear that American manufacturers as a whole have a fine opportunity to continue to dominate in the Japanese market as the success of European manufacturers rests on a rather insecure basis.

"Types of Cars Preferred

"Japanese owners and prospective buyers are not mechanically minded so the Japanese field is free of discussions of technical qualities which often influence sales. Dealers rarely discuss the mechanical features except to express hope that American cars of the future may be designed to allow for greater economy of operation. Occasionally a man will talk of shorter wheel base and narrower tread only to contradict himself by talking of roomy bodies as requisite to Japanese requirements. There has been no crystialization of opinion of four and six cylinder cars or types of higher

multiple. Every design, even up to the straight-eight, is on the market so that it may be said that any standard car can be sold in Japan, provided it is backed by an energetic selling organization.

"It has been shown by the import statistics the market demand is primarily for chassis. Complete cars entered are special limousine jobs and touring cars. Japanese body builders have been compelled to specialize on the limousine because of the decided preference for this type. So universal is the demand that builders carry a few in finished bodies on hand, leaving the upholstering and general luxury touches to be settled by the buyer. Nearly all Japanese limousines provide for at least five people and sometimes six. A frequent sight in the country is a very popular low price American car equipped with a limousines body with three extra folding seats. Coupé and sedan styles are a drug on the market as several dealers have learned to their costs. One has ten coupés on hand and has been unable to sell any during the past year. Manufacturers first entering the market or dealing with a new agency should hesitate about sending any body types other than limousine or touring. There is a very small demand for roadsters to meet the requirements of foreigners or the small amount of Japanese who are beginning to drive their own cars. The influence of women in car sales may almost entirely be discounted, hence features which appeal to women in America such as easy driving or special comfort count for practically nothing. Due to the narrow streets, short wheel base cars will always have a decided advantage.

"Standard equipment on cars should include magnetos otherwise dealers must supply them at a cost in excess of what the American manufacturer could. In this connection it must be borne in mind that when a Japanese buys a car he holds the opinion that every part is made by the car maker and so if anything goes wrong with a piece of equipment he blames the car, therefore, it is good policy to equip with standard magnetos rather than allow the dealer to equip with one of poor quality which will reflect on the car. The selling price also includes mud splash guards, spare tire, bulb horn, electric horn and an electric light in the rear roof of the car. The law requires the rear seats to be under lights, so that even touring bodies must be so equipped. Nickel plated parts do not wear well owing to climatic conditions for which reason there is a preference for brass.

"Selling Terms

"Selling on the instalment basis appears to be somewhat disgraceful as all dealers state that they do not do so, while their competitors charge them with the practice, especially at this time when it is very difficult to sell. It is said by nearly all that competition is such that there are six cars on hand for every buyer and so in order to make a sale unusual terms are offered. Under normal conditions it is probable that time payments are not granted, except on the basis of 50 per cent. on taking over the car and the balance within three months. Under Japanese law it is very difficult to recover and re-possession by law is seldom sought. The first thing a dealer does when he gets a live prospect is to make a careful investigation of his bank balance and to make inquiry of his family connections. If these prove satisfactory he may take a three months risk. But the general idea of deferred payments has not taken hold as the class of car owners generally have enough money to pay outright for a car. There are no working-men owners. Car ownership implies a chauffeur and a private garage which in turn means house ownership in a section where streets are wide enough to permit the passage of a car. As a rule Japanese houses are built very close together and the majority are approached through narrow streets, or, what we would term alleys in America. Few houses have basements so that the space required for a garage is almost equal to one-half the size of a house lot, and land is very expensive. In the country districts the farmers are, as a class, too poor to own cars, the sale being limited to the merchant class. The bicycle is still the pleasure vehicle of the masses of people and they are seen in countless numbers in almost every part of Japan. The best selling season is March, April and May, and a short fall season from September 15th to November 1st."

Nobel Industries at the Brazilian Exhibition

ONE of the principal exhibitors at the Brazilian centenary exhibition 1922, will be Nobel Industries, Ltd., who have supported the department of overseas trade in this project from its inception.

Nobel Industries, Ltd., was formed in 1918 and comprises many important British undertakings engaged in the manufacture of explosives and allied products. The interests of the companies have been extended during the post-war reconstruction period and now cover many industries other than explosives.

Their stand will be located in the north side of the western annexe of the British section and the exhibits will be of such a varied and interesting nature that we give them some detail. The whole will be contained in one large showcase.

Generally speaking, the samples of Nobel products are exhibited under four heads: Explosives—Ammunition—Metal Goods—Miscellaneous.

Explosives.—These consist of dummy blasting cartridges illustrating the cartridges generally in use in South America manufactured by Nobel's Explosives Company Ltd. (Glasgow) and Curtis's & Harvey, Ltd., such as gelatine dynamite, gelignite, dynamite—raw materials such as cotton, woodmeal, guhr and nitrate of lead—dummy samples of nitroglycerine, nitric and sulphuric acids, etc. — Detonators and electric detonators, fuse made by Nobel's Explosives Company, Ltd., Bickford Smith & Company, Ltd. and W. Bennett Sons & Company, Ltd., igniters, exploders, cards showing different stages in the manufacture of detonators and detonators connected up with blasting cartridges.

Ammunition.—Under this heading are shown dummy samples of shot-gun, rifle and revolver cartridges made by Eloy Brothers, Ltd. and Kynoch, Ltd., who manufacture in their factories cartridges for any known form of weapon, British or foreign. In addition, sporting powders are exhibited and include such well-known brands as Curtis's and Harvey's "Smokeless Diamond," "E.C.," "Schultze" and Ballistite" and various kinds of black powders.

Metal Goods.—This comprises a big variety of exhibits; wire, sheet and strip in copper, brass and other non-ferrous metals made by Kynoch, Ltd., at Birmingham; semi-manufactured articles such as components for motor accessories; complete samples such as tubes, cycle parts and brakes, rustless "Roman rims," stoves and petrol lamps and shaving stick cases.

Other interesting exhibits are carbon-free metals, thermit welding including a section of tramrail "Thermit-Welded," and metal powders of various shades.

Miscellaneous.—This embraces a wide range of goods and includes art leather cloth, soft and Collodionised incandescent mantles and vapour lamps, "Necol" Collodion products and the "Lightning" fastener.

The finished article showing art leather cloth such as blotters, cigarette cases, photograph frames, children's shoes, etc., indicate the practical and varied applications of this material as manufactured by the British Pluviusin Company (1920), Ltd., at Manchester. This cloth is very largely used for upholstering motor-cars and railway carriages.

The incandescent mantle exhibits are manufactured by Curtis's & Harvey, Ltd. (Proprietors Lighting Trades, Ltd.) in London and include "Ironclad" brand and soft mantles for use with vapour lamps and lanterns. Attention is drawn to the "Evening Star" lamp which is both effective and handsome.

Amongst the Collodion exhibits made in England by Necol Industrial Collodions Ltd., are "Necol" household cement which is waterproof and unaffected by heat and mends anything, and "Necol" plastic wood, extremely useful to pattern-makers and woodworkers, being a mouldable substance which hardens on exposure to the air.

The "Lightning" fastener is a new, quick and efficient fastener made in nickel silver for fancy leather and sports goods and clothing. The samples displayed indicate some of the applications of this clever device.

Tokyo's New Hotel

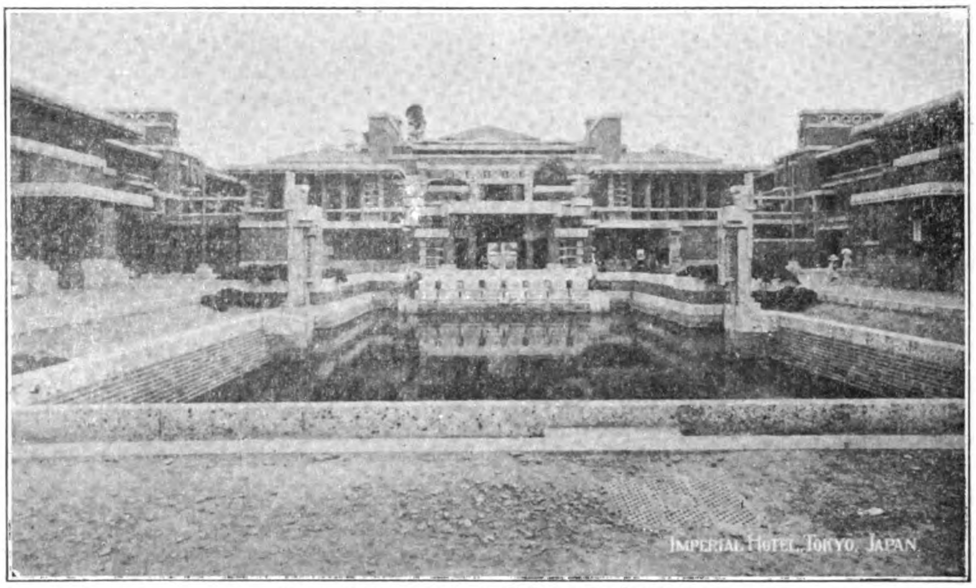
THE new Imperial Hotel was opened on July 2, 1922, to accommodate the party of Secretary Denby. Although the building is but half completed, the main rooms are now open to the public, and an increasing number of guests attracted by the unusual interest of its architecture and unique fitting, is daily passing through its corridors.

Many criticisms, just and unjust, have been made of the architectural features of the hotel, but little fault can be found with the elegance of its appointments.

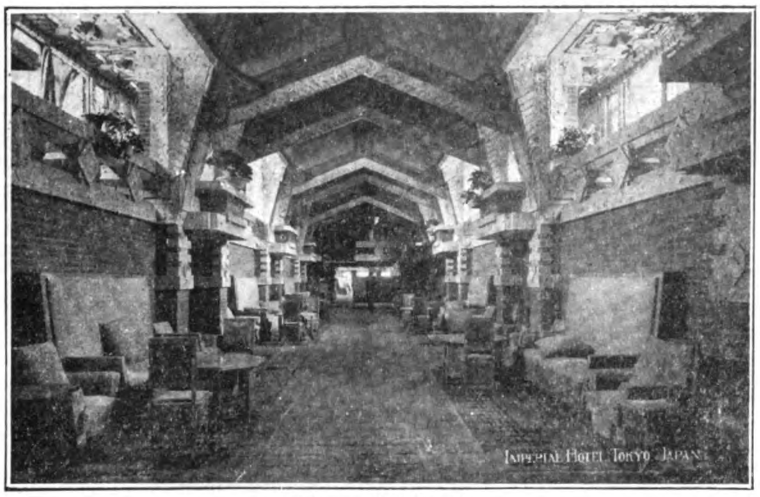
There are 250 rooms, many of them *en suite*, all with baths. The principal banquet hall will seat 1,000 people, while there are 10 small banquet rooms where another 1,000 people can be accommodated. The main dining room seats 400 people, and the grill room 250. A concert hall not yet completed will seat 1,100 people, and will be equipped with a stage on which dramatic performances can be given as well as in any theatre in Japan.

A swimming pool 25 by 60 feet is to be equipped with the latest light purifiers, which have been ordered from the United States. The barber shop has the latest sanitary appointments. Tha laundry equipment is all electrically operated, and all heating and cooking in the hotel is done by electricity. The hotel purchases 1,500 kilowatts of power from the Tokyo city electric bureau to operate this equipment.

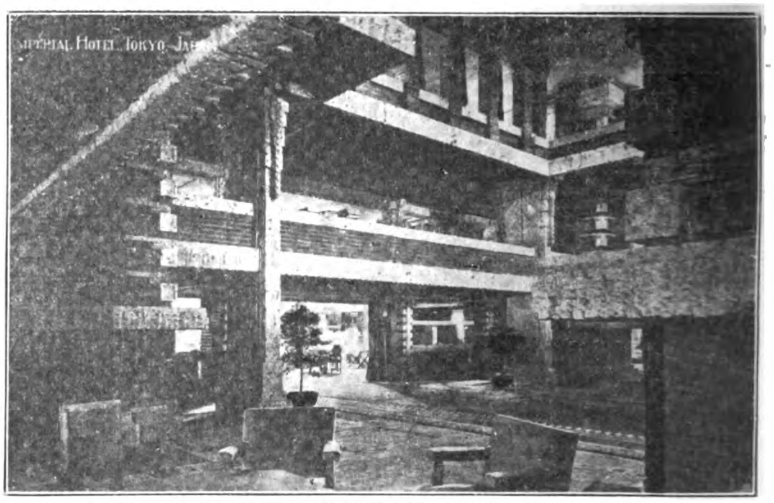
A post office is housed in the street level, and there is to be space for 46 shops each 12 by 18 feet on the same floor.



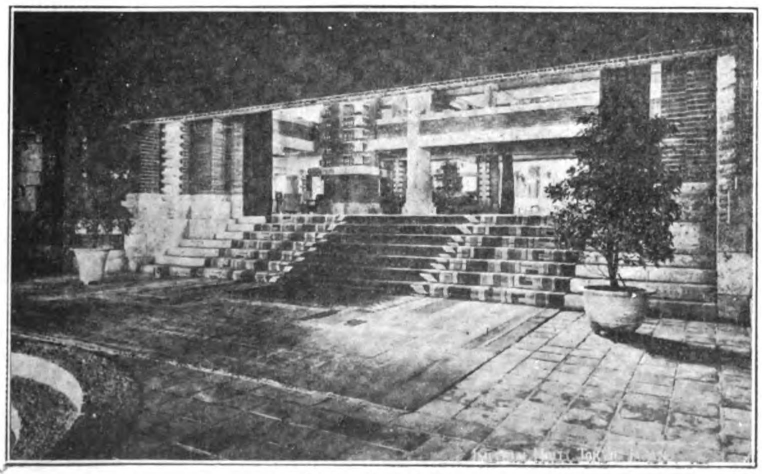
Main Entrance from Hibiya Park Side



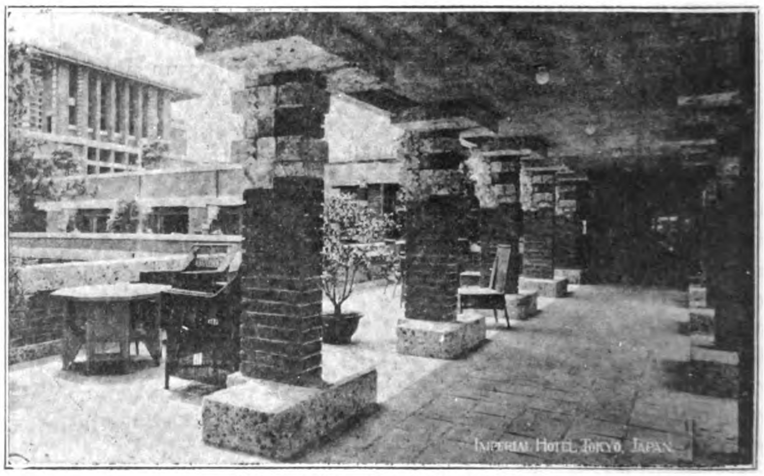
"Peacock Alley"



Main Lobby



Entrance Hall

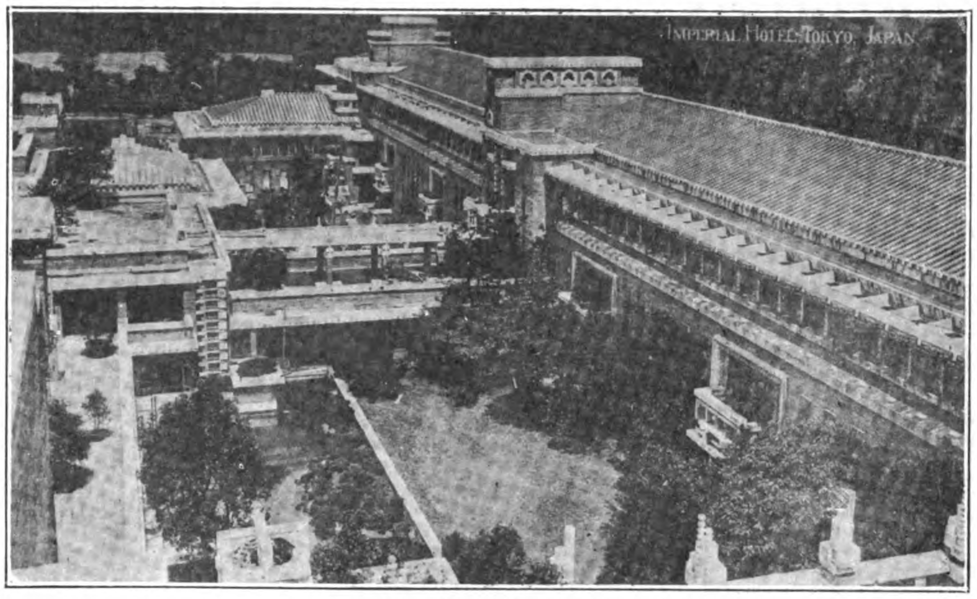


One of the many Verandahs

The total floor space of the hotel is 360,000 sq. ft. The furnishings of the hotel were built by the hotel carpenters. The rug were specially made in Tientsin, and are one of the greatest beauties of the hotel. Silver and cutlery were ordered in the United States, and the table china has been made in Japan. The upholstery was imported. There is a telephone in each room of the hotel.

The building is constructed of stone and brown brick. The brick was baked on special orders, and the stone is a peculiar soft leprous looking greeny-grey stone, quarried near Nikko, known in Japan as " Oya ishi."

The hotel is now under the management of Mr. H. S. K. Yamaguchi, of the Fujiya Hotel in Miyanoshita. The Imperial Hotel Company, Ltd., is capitalized at Y.6,000,000, of which Y.3,750,000 is paid up. There are 120,000 shares issued of which 22,000 representing Y.1,100,000 are owned by the imperial household.



View from the Roof

The officers of the company are:—

President: The Honorable K. Okura, Jr.

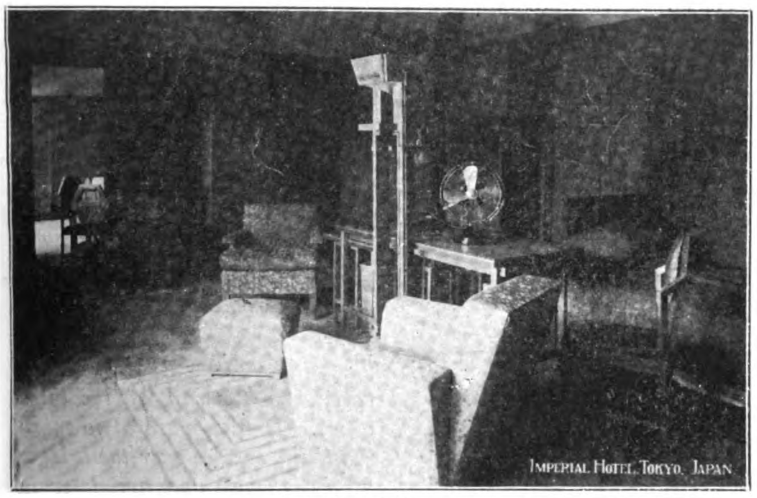
Managing Director: H. S. K. Yamaguchi, Esq.

Managing Director and Auditor: T. Kobayashi, Esq.

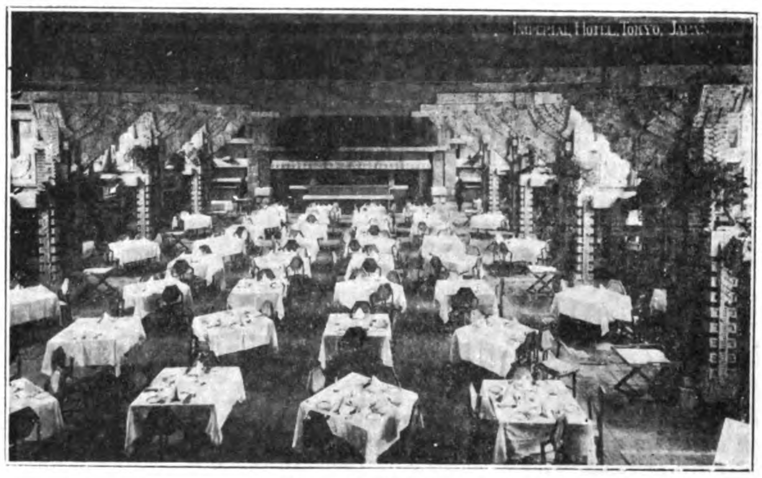
Directors: R. Asano, Esq., I. Wakao, Esq., Jr. and S. Kanaya, Esq.

Auditors: R. Wakao, Esq., and K. Koike, Esq.

Construction of the uncompleted part of the hotel will be finished in 1923.



A Guest Room



Main Dining Room

Nitrogen Fixation in Japan

According to a Japanese correspondent at Osaka, Japan, the Suyuki Trading Company, of Kobe, one of the largest commercial concerns in that country, has decided to erect a factory at Hikoshima, near Shimonoseki, with a view to fixation of atmospheric nitrogen by the Claude process. Some three years ago, one of the company's engineering experts was sent to France to investigate the process, and on his return, arrangements were made to proceed with the scheme. Owing to the secrecy with which the plan was worked out, no intimation was given of the firm's intentions until quite recently. It is understood that the scheme is to be carried out on an extensive scale, even by way of trial; and according to a responsible member of the firm, the plant is estimated to produce 10 tons of nitrogen per day during the preliminary tests. When manufacture is commenced on a commercial scale, however, it is anticipated that the output will amount to as much as 1,000 tons per day. The sulphate of ammonia market in Japan is bound to be affected if this venture comes to full fruition.

New Bridge for Tientsin

An international bridge committee is working on estimates for the new international bridge over the Hai-ho, planned at the end of Rue de France and it is possible that public tenders will be requested in the near future.

At the invitation of the committee, a meeting of the representatives of the officials, municipalities and administrations interested in the new bridge project was held in the French municipality recently under the chairmanship of Mr. W. P. Ker, H.B.M.'s consul-general.

The meeting unanimously approved the committee's proposal to build the new bridge in continuation of the Rue de France, and advised that the width of the main road should be 40 feet, the width of the sidewalks 9 feet and that the river fairway between the piers of the bridge should be 140 feet.

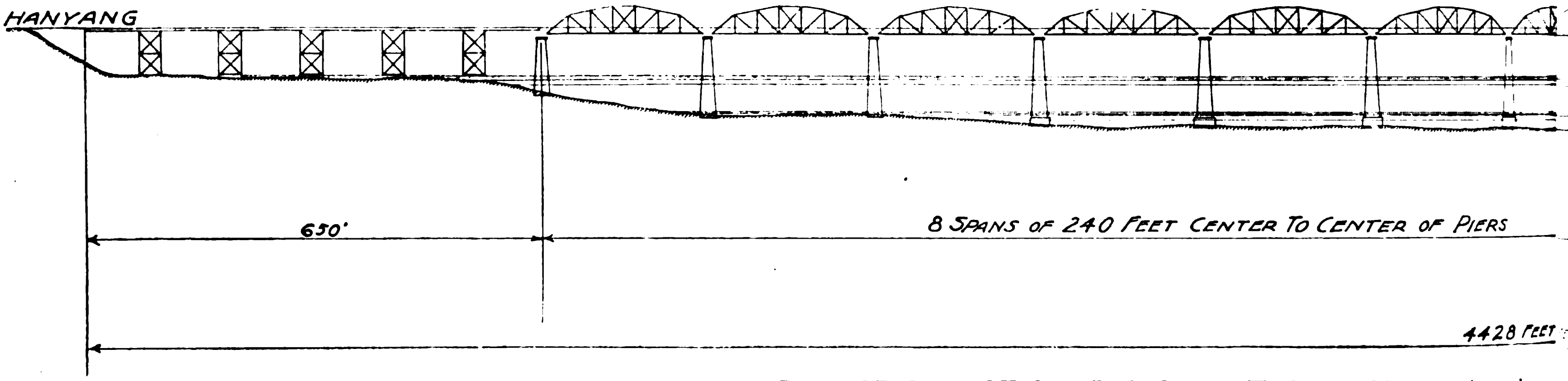
The Proposed Bridges Across the Yangtze and Han Rivers

Report upon a Project to Connect the Northern and the Southern Railroad Systems of China by Bridging the Yangtze and the Han Rivers near their Junction and to Provide Highway and Electric Railway Service between the Cities of Hankow, Han Yang and Wu Chang.

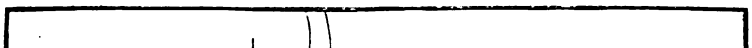
By Dr. J. A. L. Waddell, Consulting Engineer

(Ed. note.—The study of the question of bridging the Yangtze river was made by Dr. Waddell at the request of the Chinese government early in the fall of 1921. The " Commission for the New Bridge over the Yellow River " for which Dr. Waddell had come from America was dissolved at the end of August, and the minister of communications requested Dr. Waddell to remain a few weeks longer for the study of China's major bridge problems, the bridging of the Yangtze river at Hankow and at Nanking. These two crossings were carefully studied by Dr. Waddell and the preliminary plans for bridges were made along with estimates of cost. The investigation occupied several weeks and was accomplished with the assistance of the Peking-Hankow line engineers, at Hankow, and, at Nanking, with the help of engineers detailed from the Tientsin-Pukow line.

The report which follows concerns the bridging of the Yangtze at Hankow and includes the plans for two bridges, one across the Han river from Hankow to Nanyang, and one across the Yangtze from Nanyang to Wuchang. By this means the three cities, Hankow, Nanyang and Wuchang will be connected and, aside from furnishing a direct link between the Peking-Hankow R. R. and the Hankow-Canton R. R. an important municipal problem will be solved. These three cities have a total of more than two million inhabitants and, except for an irregular ferry service and a sampan traffic, are isolated while on many occasions storms close the river communication. The industries in Hankow have developed tremendously during recent years, and real estate has risen beyond all proportion to the surrounding territory. The planned bridges would greatly enhance land values in both Nanyang and Wuchang and would permit an enormous expansion.



Proposed Railway and Highway Bridge between Wuchang and Hanyang Across the



Proposed Crossings of the Yangtze and Han Rivers

There is at present no system of tramways in any of the three cities. It was planned to make the train service over the bridges an interurban one and later to build gauntleted tracks for tramcars.

The project attracted a large amount of interest among those concerned and, but for the recent disturbances in and about Hankow, might now be in the process of promotion. It is at present considered one of the most logical of the larger engineering problems and the benefits to be derived by the people of Hankow, Nanyang and Wuchang make its ultimate construction practically certain. The plans of Dr. Waddell were made in accordance with his carefully developed system of bridge economics and represent a saving of more than ten millions over previous estimates.—(Journal of the Association of Chinese and American Engineers).

Peking, October 26th, 1921.

To His Excellency,

The Minister of Communications,

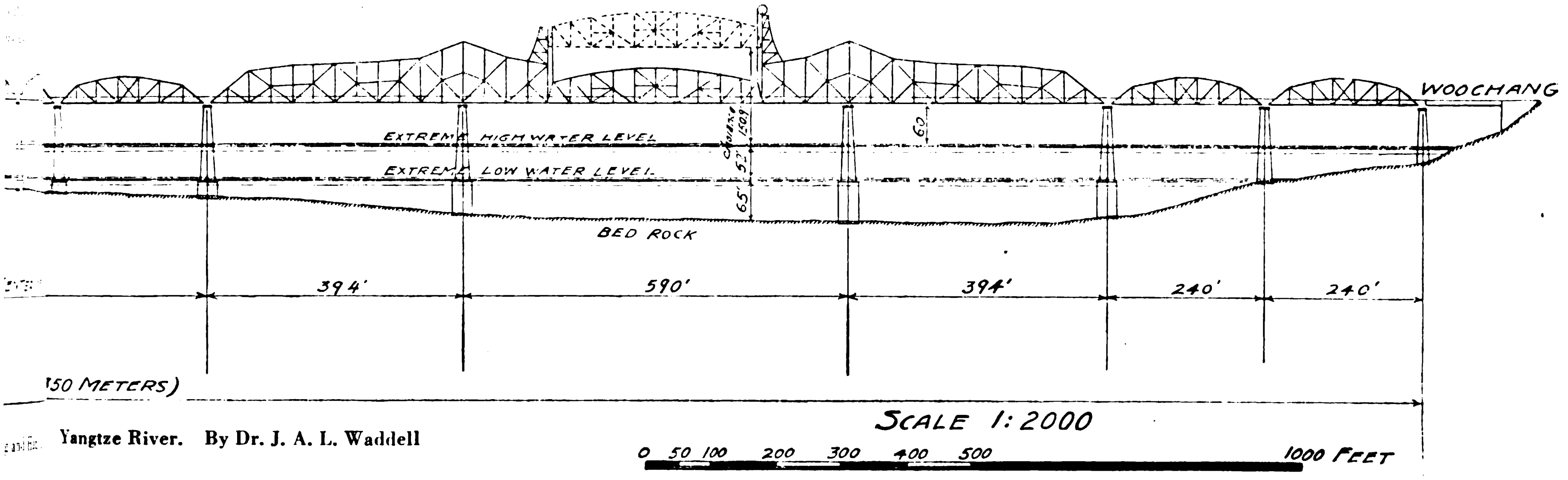
Peking.

Your Excellency,

In compliance with official instructions, I have made a thorough study of the river, railroad and highway conditions at and near the junction of the Han and the Yangtze rivers, with the view of connecting the northern and the southern railway systems of China and of providing highway and (later on) electric railway accommodations between the cities of Hankow, Han Yang and Wu Chang. The project involves the crossing of both the Yangtze and the Han rivers by " combined " bridges to carry steam-railway, electric-railway, vehicular and pedestrian traffics.

Sites.

Before starting for Hankow I was informed that there was a choice in the location of the Yangtze crossing, viz., either above or below the mouth of the Han; but I soon saw that the lower crossing should not be considered, as that would eliminate entirely the city of Han Yang, unless there were built an additional crossing of the Han to connect Hankow and Han Yang. Such a combination would not connect Han Yang and Wu Chang, except by passing through Hankow.



Yangtze River. By Dr. J. A. L. Waddell

As this combination of bridges would cost somewhat more than that of the two bridges above the junction, and as the communications between the three cities should be made as direct and intiemat as possible, I decided upon the upper site for the Yangtze structure. Moreover, this route provides the shortest possible main structure for the crossing of the larger river. The location is almost identical with the one previously selected in 1911 by the civil engineering class of the Peking government university when making a study entitled " Ideas and Proposals for a Highway and Railroad Bridge Across the Yangtze between Han Yang and Wu Chang."

In respect to the location of the proposed Han River bridge, I selected two sites, one for a high-level crossing by the railway and one farther down stream for a low-level crossing.

The three sites above mentioned are shown on Sheet No. 1 of the accompanying drawings.

Source of Information.

In addition to the pamphlet published by the civil engineering class before mentioned, I obtained through the courtesy of Mr. L. C. Kwong of the Kin-Han Railway a large-scale municipal map of the three cities and a large-scale railroad map of Hankow and some of the adjoining territory across the Han river, included in the exterior portion of the city of Han Yang.

A comparison of the widths of crossing of the Yangtze as given on the municipal map and as shown in the pamphlet just mentioned, indicated a discrepancy of some 220 metres. Consequently I had Mr. Kwong send a small party of engineers to make a triangulation of the river. The result checked the pamphlet within thirty metres, and showed an error of some two hundred and fifty metres on the map. This is probably due to the fact that the said map was printed in two parts that were afterwards pasted together, the junction being at about the middle of the river.

In making a portion of the map on Sheet No. 1 of the accompanying drawings I utilized the erring map by assuming that the two halves had been brought too close together during the pasting; and in Sheet No. 2 thereof the profile is the same as that given in the pamphlet, excepting only that the width of the river has been increased some thirty metres. The location of the bed-rock given in the pamphlet, I assumed to be correct, because several persons in Hankow informed me that, in making soundings at high stages of water, the sounding-weight indicated by the feel that rock was being struck. Not having available any apparatus nor the necessary time for checking the correctness of this conclusion, I was forced to assume it as being true, and to use it in the preparation of my estimate of total cost of structure for the proposed crossing. Of course, before taking any steps towards the building of the bridge, proper borings to and into bed-rock should be made at a low-stage of water. If any error be then discovered, my figures would have to be corrected accordingly.

In respect to the location of bed-rock for the Han river crossing, I could obtain no information whatsoever, Mr. Kwong was of the opinion that there is none within reach, and that, consequently, pile foundations would have to be adopted; but I judge that such is not the case. In my calculations of cost I assume that bed-rock will be found at a depth of fifty feet below extreme low water. If this assumption be incorrect, no great error in the total cost will be involved, provided that a satisfactory pile-resistance be found without calling for exceedingly long piles.

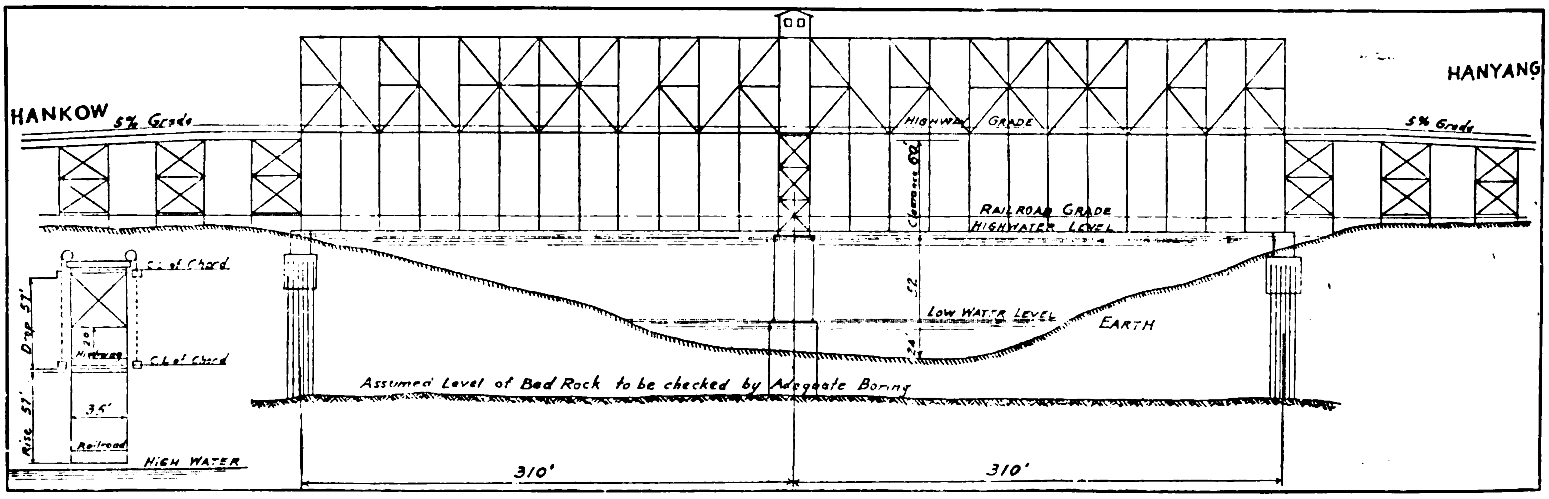
Reconnaissance.

In company with Mr. Wang and Mr. Kwong, engineers of the Kin-Han line, I made a reconnaissance, partly by jinrikisha and partly on foot, of a line to connect the Kin-Han road on the north with the Canton-Hankow road on the south. This route is indicated on Sheet No. 1. It is quite satisfactory; but I should advise draining completely the large lake between the two rivers and dyking against over-flow at high-water stages before building an embankment there. It is true that this would call for a small pumping plant to remove at high-water stages the water that might otherwise accumulate through either rainfall or seepage, or both combined; but the cost would be warranted by the great value of the land thus reclaimed. At first it could be utilized for

agricultural purposes (and as such would be found exceedingly rich and suitable for market gardening); but later it would be needed for the expansion of the cities of Hankow and Han Yang, both of which are now greatly congested. Again, the land between the two rivers will ere long be needed for the establishment of important industries.

It was not necessary for me to walk over the Wu Chang approach of the steam-railway; because, by standing at the summit of the high hill near the river, I could determine the entire route thereof. I saw that by utilizing the steep sides of two long hills. running at about right angles to the direction of the river, an excellent line with easy grade could be located, and that no buildings of any importance need be damaged.

At first I figured upon a high-level crossing of the Han river; but, owing to the location of a proposed union depot, which, for good and sufficient reasons, could not be changed, there would have been necessitated a grade of one and a quarter (1.25) per cent., in order to provide the necessary clearance for passing junks. Later, however, I decided that it would be far better and cheaper to adopt a double-deck structure, having the highway above and the steam-railway below with the grade very close to the extreme-high-water elevation, the railway deck being suspended from the over-head trusses by telescoping hangars, according to the method that I evolved and utilized a dozen years ago when building the Fratt bridge across the Missouri river at Kansas city. This structure is described at length on pages 723 and 728, inclusive, of my treatise on "Bridge Engineering."



Proposed Railway and Highway Bridge Across the Han River:
By Dr. J. A. L. Weddell

The advantages of the low-level railway-crossing of the Han over the high-level crossing are as follows:

First. There is a saving of at least $2,500,000, in the first cost, owing to the entire avoidance of expensive steel trestles.

Second. The cost of operation is much less, due to the saving of some fifty-five feet of climbing.

Third. The total length of the connecting railroad between the north and the south systems is some 7,000 feet shorter by the low-level route, thus saving, by reason of reduced length alone, something in both first cost and operation.

On the other hand, though, there are the following disadvantages:

First. The low-level crossing will interfere a little with the passage of junks, and this interference will increase as the railroad traffic augments, although probably not at all seriously.

Second. The stopping of trains to allow for the lowering of the deck would cause a small loss of time in railroad operation, although by no means as much as that involved by the fifty-five foot extra-climb before mentioned.

On the whole, the advantages of the low-level route greatly outweigh the disadvantages; and if, in the dim and distant future, the river traffic and the railroad traffic should increase so greatly as to cause too much interference, a high-level railroad-bridge could be built so as to divide the railroad traffic between the two structures and thus halve the said interference.

River Conditions.

The amount of junk traffic on both rivers is immense, and numerous craft are constantly moving both up and down stream. On the narrow Han river this is specially noticeable; and it is said that at times one experiences great difficulty there in passing by launch through the mass of vessels that extend from bank to bank. On this account I have deemed it to be both right and economic to allow, between high-water shore-lines in both bridges, a vertical clearance, above extreme high-water elevation, ample for passing the masts of the tallest junks in the district. From personal observation and by enquiry I have set this clearance at sixty (60) feet, but I did not have time to measure the heights of any masts. This assumption is sufficient for the preparation of a preliminary estimate of cost; but, before determining finally upon the layouts of structure preparatory to building, the matter should receive thorough investigation. An increase of a few feet in the clearance would augment the total cost only slightly, because the railroad approaches of the Yangtze bridge run into side-hills at each end at a short distance from the river bank, which distance would not be any greater, were the elevation of grade made a little higher. The larger cost would be mainly due to the taller piers of the bridge and the longer highway approaches. In the case of the Han river bridge, the railroad grade being close to high-water elevation, the railroad approaches would not be at all affected by the higher clearance.

It has been suggested to me that it is feasible in China to compel all junks to take down their masts when passing beneath bridges, as is the case on the Yellow river structures, where the amount of water-traffic passing is small; but on a great internal highway like the Yangtze and upon such a congested stream as the Han, to necessitate the lowering of masts would be an inexcusable hardship to inflict on navigation.

As for the passing of ocean-going vessels with their tall masts at the proposed Yangtze crossing, you will see from Sheet No. 2 that I have provided a vertical-lift span of three hundred and twenty-six (326) feet with a vertical clearance of one hundred and fifty (150) feet, which clearance could be increased, if necessary, at very small expense.

There is a condition of some importance affecting the layout of spans, viz., that large rafts of timber are floated down river. They are both long and wide; and, while it might not be economic to increase greatly the cost of structure so as to accommodate their passage between the piers, it is only proper that the rights of the owners of rafts should be given due consideration. With the layout I have adopted, the smaller rafts could pass anywhere, the least horizontal clearance between piers being a little more

than two hundred feet; but the larger rafts would have to be so steered as to go under one of the three longer spans. The horizontal clearance of the main opening, being over five hundred and fifty feet, ought to give ample facility for the passage of the largest of such rafts, provided it be properly navigated.

LAYOUTS.

As can be seen by reference to sheet No. 2, the layout for the proposed Yangtze crossing, starting from the Wu Chang side, consists of two through simple-truss spans, each 240 feet, an anchor arm of 394 feet, a cantilever span of 590 feet, an anchor arm of 394 feet, and eight through, simple-truss spans of 240 feet each, all measurements being taken from centre to centre of piers. This layout practically covers the entire river between high-water shore-lines.

The layout for the proposed Han river crossing consists of two simple truss spans with parallel chords, carrying a suspended deck for the double-track railway, as shown on Sheet No. 3.

TRAFFIC PROVISIONS.

The question of double-track *versus* single-track for the two structures is one to which I have given considerable thought. In America the question would not have arisen; for experience has taught American railroad engineers that it is always truly economic in the case of a long and expensive proposed railroad bridge to provide for a double-track, because eventually it certainly will be needed. Here, however, where money for big enterprises is scarce, I felt that the point should not be decided without full deliberation.

In view of the fact that the length of the Yangtze bridge and its steel approaches is about a mile, if this length were to be of single track and later both the north and the south trunk lines were to be double-tracked (as undoubtedly they will be some day), the volume of traffic would be far too greatly restricted. It is true that there might be adopted an expedient I evolved and patented in the U. S. A. many years ago, by which the piers are built for double-track, as are also the cross-girders of the superstructure, two of the four lines of stringers being temporarily omitted, the trusses being strong enough for single-track only, and provision being made for building duplicate trusses alongside and so connecting the old and the new ones as to make them divide the total load equally between them.

Were the structure to be a railway bridge pure and simple, such an arrangement might save temporarily a considerable amount in first cost and a large sum of money in interest charge; but as highway traffic has to be taken care of at once, this expedient is really not feasible.

For the Yangtze crossing I have, therefore, adopted a cross-section, as shown on Sheet No. 2, having the double-track steam-railway between the trusses with an eighteen-foot roadway on each side, exterior thereto, and an eight-foot sidewalk outside of each roadway. The traffic on each roadway is to be in one direction only; and this restriction will apply to the sidewalks also.

At present there are no electric tramways in any of the three cities, but the time is coming when there will be; and it will then be highly advisable to connect the tram lines of the three cities. This could be done by building separate approaches to each bridge for the said tram lines, and by running them between the trusses on gauntleted tracks. This expedient obviates the necessity for any switching or any blocking system between the steam railway and the electric line.

I have laid out both structures and their approaches so that there would be no intersection at grade of any two kinds of traffic—an arrangement that not only increases materially the capacity of the bridges but also reduces to zero the possibility of accident from intersecting traffic.

Pedestrians are to be admitted to and taken from each bridge by stairways located near the high-water shore lines; and they should never be allowed to enter the highway-traffic road-ways. Jinrikisha men and those hauling carts, of course, should not be considered as pedestrians, but should be compelled to use the said roadways.

Ramps with grades not to exceed eight per cent. might be substituted for the stairways; but, whichever type of pedestrian approach be adopted, landings or resting place should be provided.

On sheet No. 3 is shown a cross-section of the Han river bridge, indicating that the highway traffic is carried at the upper level between the trusses and the sidewalks at the outside thereof, and that the railway traffic is cared for at the lower level by a steel floor-system suspended by telescoping hangars from the truss above. For the purpose of reducing to a minimum the total weight to be lifted by the electric machinery, the said floor-system should be manufactured of some high alloy of steel, such as nickel steel.

GRADES.

In my opinion, the greatest allowable grades should be one per cent. for the steam-railway, five per cent. for the highways, and from five to seven per cent. for the electric tram-lines. The proper limit for the latter will depend upon a number of conditions; but any grade between these figures would be fairly economical in respect to both first cost and operation.

LIVE LOADS.

For these structures I advocate the adoption of the following live loads as given in "Bridge Engineering":—

Steam railway	Class 60
Electric railway	Class 25
Highways (Floor system)	Class B
(Trusses)	Class C
Footwalks	Class C

SPECIFICATIONS.

For designing the substructure and the superstructure of these bridges I am of the opinion that it would be best to adopt the specifications, principles, and methods given in my "Bridge Engineering," but if, for any reason, the superstructure specifications of the American railway engineering association be preferred, there could be no valid objection to their adoption.

MATERIALS.

I have figured on employing carbon steel for the entire superstructure; but later on it may be found more economical to employ nickel steel or some other high alloy of steel instead, especially for the moving span of the Yangtze river bridge and for the moving deck of the Han river structure.

For the railway floor I assumed the American standard practice of employing creosoted wooden ties and guard-rails with a narrow plank footwalk on each side for the use of employees only, the spaces between the ties not to exceed five inches.

For the highway floors I have adopted creosoted-block pavement four inches thick, supported on reinforced-concrete slabs about seven inches thick. In order to reduce the weight of this case to a minimum, I have estimated upon employing Haydite concrete, which effects a saving of some fifty pounds per cubic foot, as compared with ordinary concrete.

For the footwalks I have adopted four-inch slabs of reinforced Haydite concrete.

For the shafts of piers I have figured on using plain concrete, excepting that the copings thereof should be of dressed granite. As there is no ice in the river, there is no need for using granite facing for any portion of the piers.

For the bases of the piers sunk in deep water, I have estimated upon using timber shells filled with concrete up to an elevation of four feet below extreme low water; but for those sunk in shallow water or on a sandbar, I have adopted reinforced concrete for the shells, in order to avoid the employment of timber, which at Hankow would be quite expensive. It is necessary to adopt it for the deep-water piers, in order that the caissons may easily be floated into place.

Methods of Construction.

As all piers will reach bed-rock, at a depth not exceeding seventy feet at low water, I have adopted the pneumatic process throughout. It will be necessary to put down the caissons at comparatively low stages of water, although, after the sinking of a caisson is well started, it will be practicable to continue it, provided that the head of water does not exceed one hundred and fifteen feet.

Erection of spans should be done at comparatively high water by the method of flotation. The conditions for this at Hankow are quite favorable. I have employed the method extensively in my American practice on such rivers as the Fraser, the Williamette and the Columbia on the Pacific coast, and am figuring on so doing for the proposed Mississippi river bridge near New Orleans.

Unit Prices of Materials.

In determining the unit prices of materials in place I have used much deliberation; because, while I do not want to make the total cost so high as to discourage building, I cannot risk my hardly-earned reputation as a safe estimator by adopting figures that are lower than those which it would be found necessary to pay when letting the contract for construction. I made careful enquiries as to the cost of timber, piling, sand, brokenstone, granite masonry, cement, common labor, skilled labor, etc., at Hankow; and I guessed that the probable cost per pound for carbon steelwork delivered at Hankow would not exceed 4.25 cents gold, allowing for erection and profit thereon 2.0 cents per pound gold, making 6.25 cents gold erected, which is now equivalent to 11 cents Mex.

In proof of the correctness of this surmise I would state that a few days ago I received a letter from my New York office containing the information that it had just let the contract for a steel bridge at Trenton, New Jersey, at 4.6 cents per pound erected. Allowing one cent gold per pound for freight and 0.5 cent gold per pound for extra cost of erection at Hankow would bring the total to 6.1 cents gold, which is a trifle under the 6.25 cents that I had assumed.

For the average cost per pound of the machinery and wire ropes for the vertical lift, I had assumed 50 cents Mex.; and I am informed that at the before-mentioned Trenton-bridge letting, which structure will include a vertical lift span, the pound prices in gold that were tendered ranged from 15 to 20 cents for the main sheaves and from 22 to 30 cents for the operating machinery, equalizers and ropes. An average of these figures is 22 cents gold, which is now equivalent to 38.5 cents Mex., proving that my allowance was ample.

Estimated Quantities of Materials.

Upon the assumed profits of bedrock I have estimated carefully in detail, and have checked the quantities of copings, shafts, and bases of all piers, and those of all materials entering into the flooring of the superstructure. As for the weights of metal, I took them from the diagram on page 155 of my "Economics of Bridgework," which diagram was prepared from the estimated weights of carbon steel for various span lengths in my before-mentioned proposed Mississippi river bridge near New Orleans, the carrying capacity of which is exactly the same as that assumed for the proposed Yangtze and Han structures.

I am offering these statements in order to give you confidence in respect to the correctness of my estimates of cost, fearing that the remark made by my British colleague at a general board meeting of the Yellow river bridge commission may have reached your ears and prejudiced your judgment of my estimates. He stated that my estimates of cost for an economically designed bridge to cross the Yellow river would have to be greatly increased; because engineers' estimates were always too low, his own often having been exceeded by as much as one hundred per cent. My reply was that if my estimates of cost should be over-run by even a small portion of that percentage, I would soon be entirely out of work.

In America engineers *must* figure closely; and my estimates are very seldom over-run, and then only slightly. For instance, the last estimate I made before leaving New York was for the superstructure of a bridge consisting of three spans of three hundred feet each, the middle one being a vertical-lift span. My estimate of total cost was $620,000, and the lowest bid (which took the contract) was $619,000.

In the case of the before-mentioned Trenton bridge, let last month upon a falling market, the contract was awarded for a sum materially below our estimate of cost.

Estimates of Total Cost

My estimates of cost are as follows:

YANGTZE RIVER BRIDGE.

Substructure.

Copings 582 cu. yds. .. .. .. @ $ 40 =	$ 23.280
Shafts 48,568 cu. yds. .. .. .. @ $ 17 =	825,565
Bases with concrete shells 5,000 cu. yds. .. @ $ 33 =	165,000
Bases with timber shells 15,326 cu. yds. @ $ 42 =	643,692
Total cost of substructure	$1,675,628
Ordinary structural carbon steel, 51,450,000-lbs. @ 11 cents	$5,659,500
Machinery and ropes, 280,000-lbs. @ 50 cents ..	140,000
Flooring, 3,770 lin. ft. @ $ 120	450,000
Counterweights, 1,030 cu. yds. @ $ 25	25,750
Electrical apparatus and house	44,000
Total cost of superstructure ..	$6,319,250

Railway Approaches.

Steel, 4,400,000-lbs. @ 10 cents	$440,000
Flooring and pedestals, 1,750-ft. @ $30	52,500
Total cost of railway approaches ..	$492,500

Highway Approaches.

Steel, 1,800,000-lbs. @ 10 cents	$180,000
Flooring, 1,750 lin. ft. @ $ 70	122,500
Stairways	22,500
Total cost of highway approaches	$325,000

Grand Total.

Substructure of bridge	$1,657,628
Superstructure of bridge	6,319,250
Railway approaches	492,500
Highway approaches	325,000
Summation	$8,794,378
Engineering and contingencies, 10%	879,438
Total cost of Yangtze bridge and approaches ..	$9,673,816
Say	9,700,000

HAN RIVER STRUCTURE.

Substructure.

Shafts, 2,100 cu. yds. @ $ 17	$ 35,700
Bases, 3, 530 cu. yds. @ $ 33	116,490
Total cost of substructure	$152,190

Superstructure and Towers.

Ordinary carbon steel, 10,600,000-lbs. @ 11 cents	$1,166,000
Flooring, 640-lin. ft. @ $ 120	76,800
Machinery and ropes, 448,000-lbs. @ 50 cents ..	224,000
Counterweights 640 cu. yds. @ $25	16,000
Electric apparatus and house	80,000
Summation	$1,562,800
Highway Approaches (To Carry Also Electric Railway Trucks) and Stairways	$560,000

GRAND TOTAL.

Substructure of bridge	$ 152,190
Superstructure of bridge, and towers	1,562,800
Highway approaches and stairways	560,000
Summation	$2,274,990
Engineering and contingencies 10%	227,500
Total cost of Han river bridge	$2,502,490
Say	2,500,000

CONNECTING RAILWAYS.

Double-track railway with small stations, sidings, etc., complete, 5 miles @ $60,000	$300,000

TOTAL COST OF PROJECT.

Yangtze river bridge	$ 9,700,000
Han river bridge	2,500,000
Connecting railway line	300,000
Grand total cost of project	$12,500,000

ECONOMICS.

A study of the preceding estimates of cost might cause one to think that the layout of spans is not economic, because the cost of the superstructure is so much greater than that of the substructure. It is true that the adoption of shorter spans would reduce somewhat the grand total cost of the project; but I believe that it would interfere too much with navigation.

NECESSITY FOR MATERIALIZATION OF PROJECT.

In my opinion, the materialization of this project in its entirety, in the manner in which I have laid it out, is of paramount importance to the Chinese republic. The connection of the two great railroad system would be a link that would bind closely together North and South China, not merely by increasing trade between them, but by facilitating personal intercourse between the two sections of this great country, unhappily at present so divided. It would be a great pity to have the existing division continue indefinitely, for the results thereof would be just as disastrous as would have been those in America, had the attempted segregation of the southern states from the union proved successful.

Again, there are approximately two million inhabitants in the three closely-located cities at the mouth of the Han; and the only present means of communication between them is by water. In stormy weather it is exceedingly difficult, and occasionally totally impracticable, to cross the Yangtze at Wuchang; hence highway-bridge connection between the three cities would be a real boon, and would undoubtedly give a great impetus to the business of the entire district. The existence of the railroad connection would induce the establishment of new manufacturing enterprises in all three of the cities; and the draining of the shallow lake between the two rivers, before referred to, would provide ample space therefor—to say nothing of that which would be available along the banks of the Yangtze both above and below the suggested crossing.

The materialization of this project is as important a matter for the development of China as any that has ever been suggested; and patriotic Chinese capitalists would do well to give it immediate and serious consideration.

SUGGESTED METHOD OF FINANCING.

I am of the opinion that, as soon as the present upset condition of the financial world has changed for the better, it would be practicable to procure from American bankers the money needed for building the two bridges and the connection railroads. It would be necessary, though, for the Chinese government to guarantee the ultimate payment of both principal and interest, and to allow the bond-holders to operate the structures and collect the tolls until the debt is cancelled, the said tolls being applied to the payment of interest and to the refunding of the principal.

The highway travel over the bridges would be immense, were reasonable tolls adopted; and there should be a charge made for every loaded or unloaded car carried across by the railroads.

At present there should be considerable freight for the north from the territory traversed by the Hupei-Hunan section of the Canton-Hankow line; and as soon as the existing gap is completed, the amount of both freight and passenger rail-traffic over the bridge would be enormous.

Later on I might be able to be of service in securing American capital for this enterprise; and, if so, it would give me great pleasure and satisfaction to aid the Chinese government in that manner.

CONCLUSION.

In conclusion, permit me to offer the suggestion that this report be given to the Chinese institute of engineers and to the association of Chinese and American engineers for publication in their proceedings, from which it would undoubtedly be copied largely both at home and abroad, thus bringing the project to the attention of the financial world.

Trusting that this work which I am herewith completing will meet with your excellency's approval.

I remain, with great respect,

Yours faithfully,

(*Sgd.*) J. A. L. WADDELL,

Consulting Engineer.

New Sino-Japanese Loans

IT is reported that Mr. Chang Chien, who is a leading business man in Nantungchow, an industrial town in the mid-eastern part of China, and who was formerly the minister of agriculture and commerce, is now interested in a movement for the raising of three private loans in Japan, that is, one for Yen 30,000,000, another for Yen 15,000,000, and a third for Yen 8,000,000, for the purpose of starting land exploitation and irrigation schemes in the south-eastern region of Kiangsu, between Nantungchow and Hweichow, and also for the development of the spinning industry in Nantungchow, in which Mr. Chang is concerned. It is said that three delegates of Mr. Chang are now in Japan and are negotiating with Japanese capitalists belonging to the Japan-China business association through Viscount Shibusawa, and that the Japanese investors are rather favorably inclined to the proposal.

Strangely, however, this proposal is said to be exciting considerable opposition among the Chinese people, and Mr. Chang is reported to be having a difficult time in explaining his position to them. We are puzzled to understand why the Chinese people are opposed to the idea, unless it is merely due to the usual anti-Japanese sentiment. It may be that they fear these loans will lead to the destruction of sovereignty in China, but it is impossible that a purely private and genuinely economic loan for the development of the land, which is bound to result in the promotion of the interests of the local people, should prove dangerous to the sovereignty of the country. On the contrary, history most clearly shows the tremendous public benefit, which similar loans have brought to the people of China, as in the case of the Wei Ho conservancy loan, which was signed in April, 1916. This loan, at first, originated from the importation of $20,000,000 gold from America on the security of the land revenue, the river-improvement tax, and the canal transit duty in the province of Kiangsu, as the result of negotiations between Mr. Chang and Dr. Reinsch, American minister to China, who at the time was a representative of the American red cross society. Later the Siems-Carey Railway & Canal Company of America and the Industrial Bank of Japan jointly invested $6,000,000. So far as our knowledge goes, this has so far not affected the sovereignty of China in the least, nor can it ever do so in the future.—*Osaka Mainichi.*

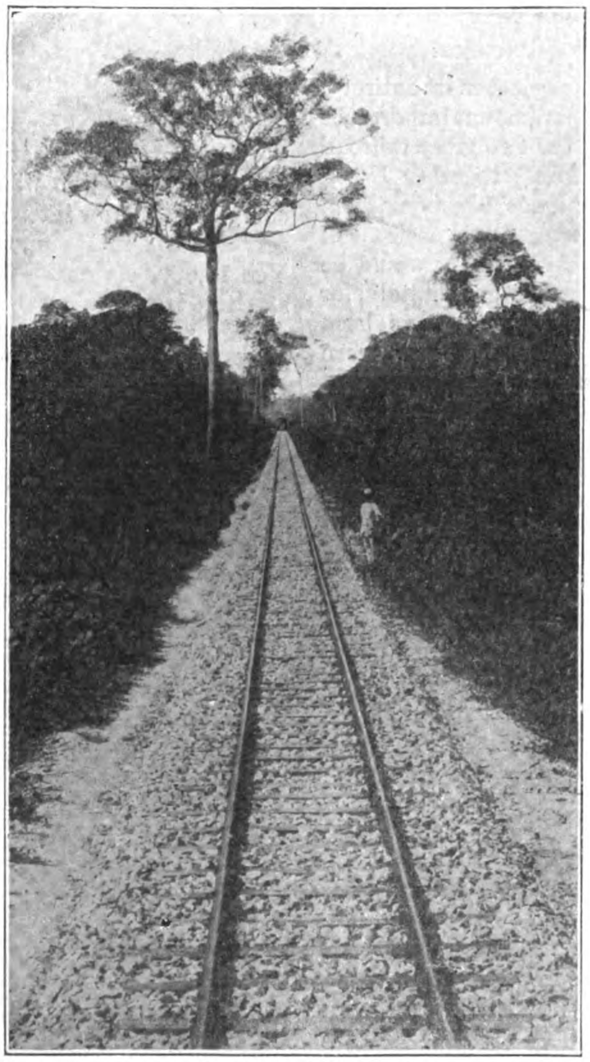
Siam State Railways: A Station on the Southern Line

Siam State Railways' Building Program

CONSTRUCTION work which will make it possible to travel from Bangkok to some of the most remote parts of the kingdom of Siam is now being carried on by the Siam State Railways. It is hoped that within the near future it will be possible to travel from Penang and Singapore through Siam to the principal cities on the French system in Indo-China without the change of cars. A ten-year program outlined by the railways includes (1) the conversion of the northern, north-eastern and eastern lines from standard to metre gauge, in order to be uniform with the gauge adopted by the neighboring countries and of the Siamese southern line, (2) the linking up of the systems on the east and west banks of the Menam Chao Phya by a bridge across the Menam, (3) the extension of the eastern line from Petriew to Aranya Pradesa, 5.9 kilometres from the Cambodian boundary, and (4) the extension of the north-eastern line from Korat (Nakorn Rajasima) to Ubol, a city not far away from the Mehkhong river.

The move to make the entire Siamese system into a metre gauge railway has for its purpose the ultimate union of the various railways throughout south-eastern Asia. The F.M.S., French Indo-China and Burma railways are all of the metre gauge and by making the Siamese lines conform, Siam will weld an important link in the chain of railways which in time will carry the traveler from Singapore via Bangkok and Hanoi to Yunnan, and from Mandalay via Rangoon and Moulmein to Saigon.

The southern line, from Bangkok Noi to Padang Besar and Sungei Golok the stations on the borders of Kedah and Kelantan respectively and the system east of the Menam were originally separate railways, and were not united until July, 1917, when they were put under the administration of the present Commissioner General, H.R.H. Purachatra, the prince of Kambaeng Bejra. The standard gauge lines composed the first railways, and were started in 1892 with the building of a line from Bangkok to Ayudhya (71 kilos.) completed in 1897. The last piece of standard gauge track to be laid was the section from Pang Yang to Chiengmai, which, on January 1st, 1922, was opened to traffic, completing the line of 756 kilometres from Bangkok north. The total length of standard gauge lines is 1025 kilometres. In the year ending March 31st, 1921, the standard gauge lines yielded a net profit of Tcs. 2,735,575, a return of 4.51 per cent. on the investment of Tcs. 60,602,610. The gross receipts for the year were Tcs. 5,787,090.

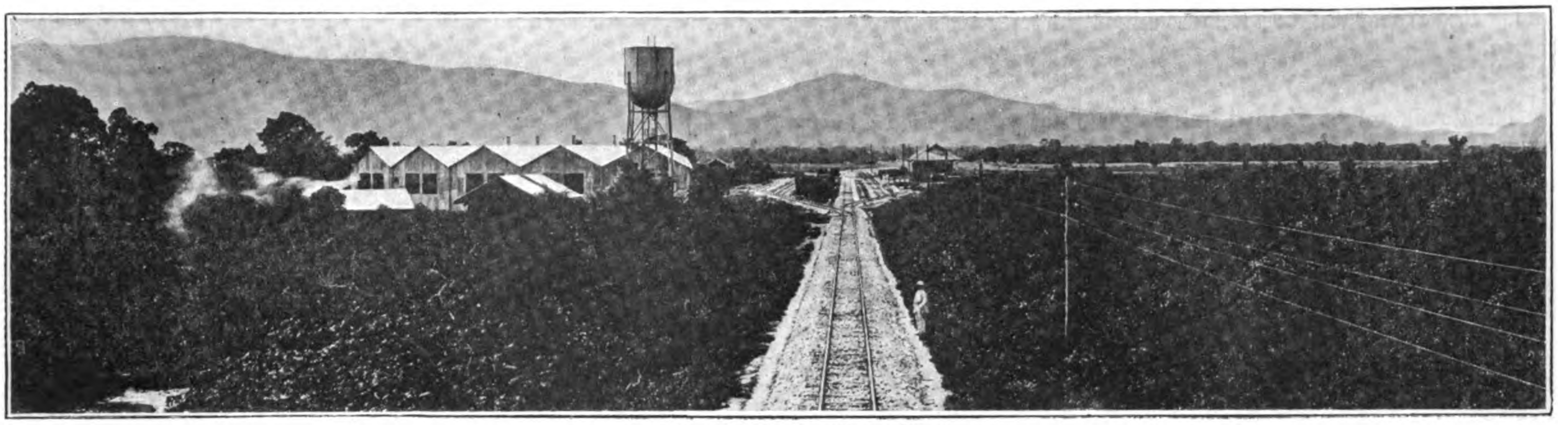


A Completed Section of the Southern Line

The southern lines were projected in 1909 and a second railway department organized to build and administer the metre gauge railways down to peninsula. Through service between Bangkok and Penang was first started in 1918, three days being required for the trip. On January 1st, 1922, day and night coach and restaurant car service was introduced on this line, and the weekly express now makes the trip in 34 hours. In 1920-21 the southern lines earned a net profit of Tcs. 1,285,-187, a return of 1.99 per cent. on the investment of Tcs. 64,453,190.

The decision to unify the gauge of the two parts of the system was made on the 8th September, 1919. The conversion of the standard gauge lines to metre gauge is being accomplished by laying a third rail between the existing rails, the outer rail will eventually be taken up. A set of double points and crossings with suitable switches was designed by the engineers of the technical office of the department of state railways, and practical trials made. The actual work of laying the third rail on the eastern and river lines was begun November 20th, 1920. The conversion of the eastern and north-eastern lines is now completed, and metre gauge rolling stock is used from Bangkok to Petriew and from Bangkok to Korat.

The extension from Petriew to Aranya Pradesa at the Cambodian border has been completely surveyed, and will have a total length of 193.2 kilometres. The line has been cleared and earthwork completed on the first section of 99 kilometres. On the remaining



Ootahao Station, Southern Line

section on account of the scarcity of labor it has been decided to carry out construction by machinery, thus doing away with the large manual labor required and reducing sickness and mortality among the laborers working in an unhealthy district to a minimum. At present a large number of the most up-to-date machines have been imported from America for this work. Up March to 31st, 1921, Tcs. 3,965,042.34 had been expended on this extension. The estimated cost when completed is Tcs. 13,542,672.

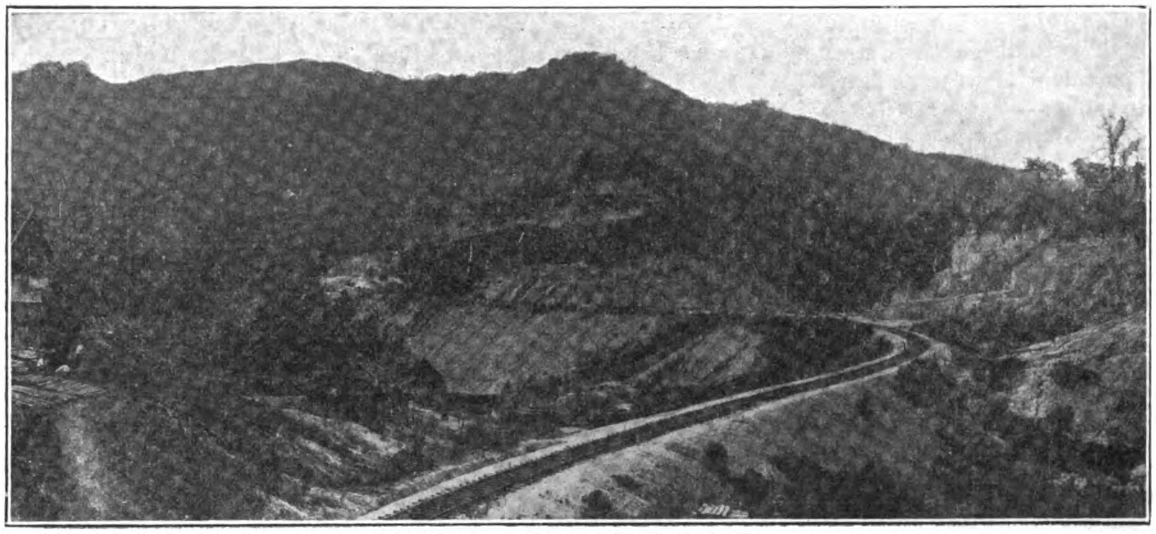
Aranya Pradesa will for the present be the terminus of a first-class motor road to the world famous Angkor Wat and via Pnom-Penh, the capital of Cambodia, to Saigon.

The survey of the north-eastern line extension from Korat (Nakorn Rajasima) to Ubol shows the total length to be 312 kilometres. A section of 147.95 kilometres has been cleared and earthwork on this section was on the point of completion. The expenditure to the end of March, 1921 was Tcs. 734,770.18.

The contract for the bridge across the River Menam was awarded to the firm Daydé of Paris, who constructed the Pont Doumer over the Red river in Tongkin.

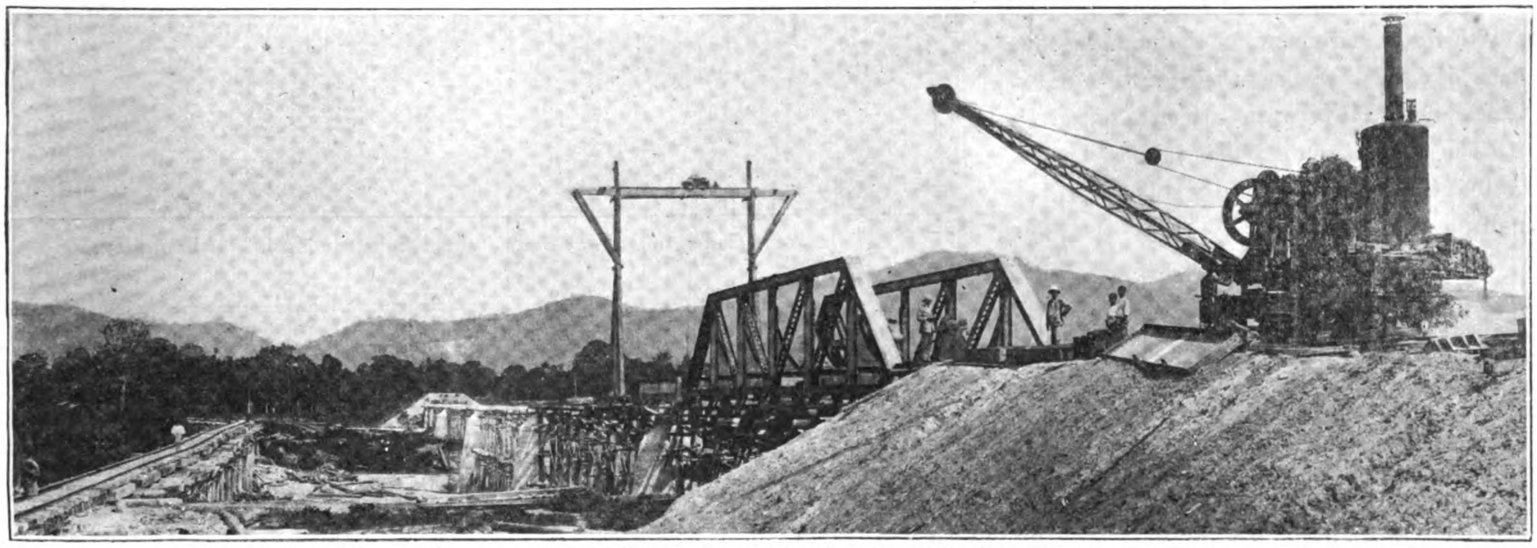
The east branch of the southern line, from Haad Yai to Sungei Golok, connecting with the east coast line of the F.M.S. railways and giving through service to Hhota Bahru in Kelantan, was opened for traffic in November 1921. The length of this branch is 210 kilometres and cost Tcs. 11,473,704 to build. This line will in the future be the alternative route to Singapore.

Arrangements have been made to open through service on the northern line this November. At present the journey from Bangkok to Chiengmai is made in three stages, passengers being required to spend two nights in railway resthouses *en route*. When sleeping and restaurant cars are placed on this run, the continuous running time will be reduced to 26 hours.



The Northern Line under Construction

Since 1918 the administration of the rural highways has been placed under the commissioner general of railways. This arrangement allows for a consistent scheme of transportation, whereby the road system will be made to supplement the rail and waterways of



Erection of Steel Bridge on the Patani Section of the Southern Line

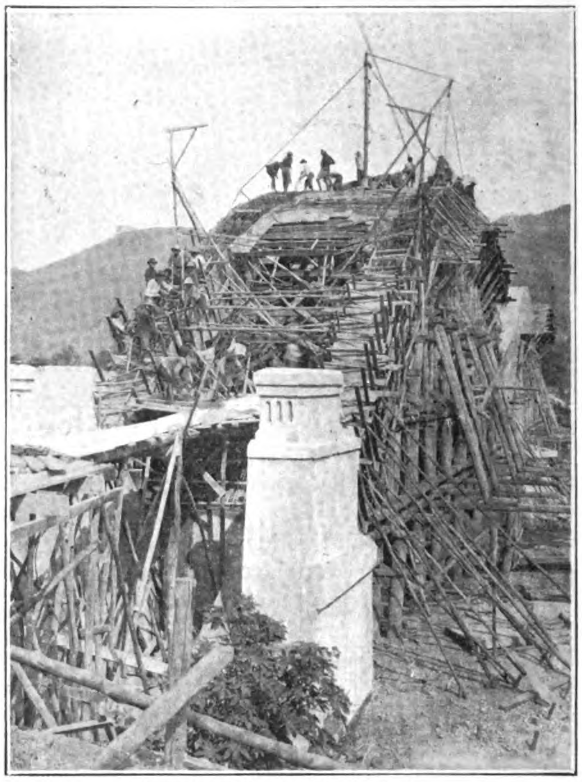
Siam. Roads are made to act as feeders to the railways at important centres.

The development of road building has not yet reached a standard set, as for instance, by French Indo-China. Outside the cities there are few first-class roads in Siam, principally for want of funds. Although there are 3,676 kilometres of roads under the direct control of the department of ways, only 83 kilometres, the road between Songkhla (Singora) and Sadao, a village near the Kedah border, is ranked as first class.

The department of ways keeps a careful census of traffic on the various roads of the kingdom, and ranks each road according to the traffic it must bear. Upon the class of the road depends the appropriation which will be spent in its maintenance. Whenever traffic on an inferior road increases sufficiently, the road is reclassified and resurfaced with better material.

From the year 1919 to March 31st, 1921, Tcs. 3,515,984 53 had been spent by the department of ways. Of this amount Tcs. 1,233,464.11 was expended in road construction, Tcs. 1,365,365.79 for improvement, and Tcs. 751,604.36 for maintenance.

The total length of state roads under the direct control of the department of ways at March 31st, 1921 is analysed in the following table :—



Another View of Same Bridge

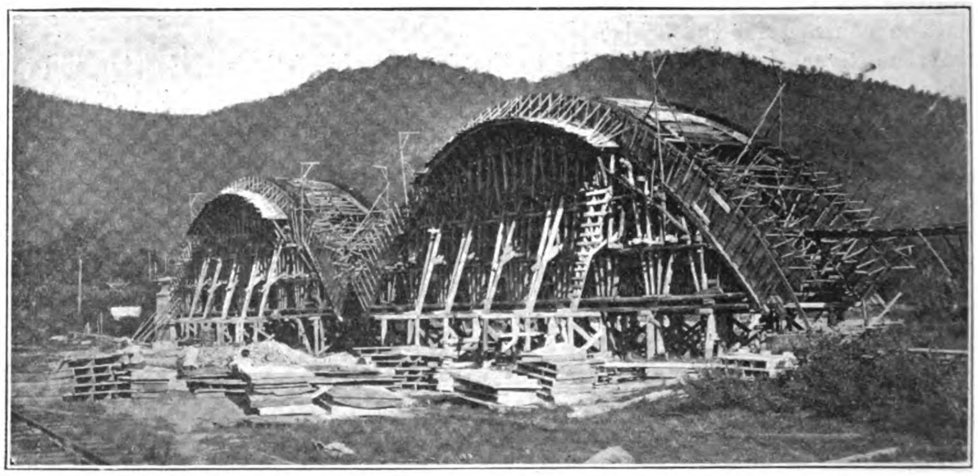
Division	Under Maintenance					Under Improvement					Under Construction					Total per class					Total
	I	II	III	C.T.	B.P.	I	II	III	C.T.	B.P.	I	II	III	C.T.	B.P.	I	II	III	C.T.	B.P.	Kms.
Northern	—	57	39	—	—	—	—	45	34	—	—	—	206	39	—	—	57	290	73	—	420
Central	—	—	—	—	—	—	—	—	1,936	—	—	—	47	112	—	—	—	47	2,048	—	2,095
Southern	83	43	30	—	—	—	—	193	400	—	—	14	183	215	—	83	57	406	615	—	1,161
Total B. E. 2463	83	100	69	—	—	—	—	238	2,370	—	—	14	436	366	—	83	114	743	2,736	—	3,676
Total B. E. 2462	—	4	—	—	—	83	96	279	2,370	—	—	—	459	276	—	83	100	738	2,646	—	3,567

N.B.— I First Class Road
— II Second Class Road
—III Third Class Road

C.T. Cart Track
B.P. Bridle path.

Buddhist Era 2464 is the period from April 1st, 1920 to March 31st, 1921

In all their work as regards the question of transport the Siamese have shown great energy and efficiency and it is hoped that at no distant future the whole kingdom will be covered by a network of roads and railways to cope fully with the requirements of the country, but the lack of funds has been their greatest drawback, hence the full program, which is not given out to the general public, has had to be cut down to utilize only the grant now placed at their disposal.



Reinforced Concrete Railway Bridge under Construction in Northern Siam

Siam Railway Orders

The tender of the Cravens Railway Carriage and Wagon Co., Ltd., of Sheffield, represented in Siam by the Anglo-Siam Corporation, Ltd., for the supply of 25 under-frames for railway carriages and 50 bogies and spare parts, has been accepted by the department of state railways. The contract price is £15,309 15s. f.o.b. Middlesbro.

The East Asiatic Co., Ltd., acting on behalf of the Société Anonyme John Cockerill of Belgium, were the successful tenderers for the supply of 11,000 tons of steel rails and accessories, at a price of £112,537 11s. 4d. c.i.f., including handling and stacking on railway premises and demurrage charges for delay of steamers.

When Will You Go to America?

In making preparations for your American trip, remember how much the selection of your hotels has to do with your comfort, convenience and pleasure.

In five of the principal American cities, some or all of which you are almost certain to visit, there are hotels operated by the Statler Company—and they rank with the best hotels in the world. Anyone who knows the cities will confirm that statement—and can probably give you many instances of extra conveniences which mark the Statler-operated hotels.

It is wise to make reservation of your room or suite before you leave home. That will be attended to for you by any office of Messrs. Thos. Cook & Son or you can write direct to that one of these five hotels which you expect to visit first.

Whether you expect to go to the States this week, or next month, or next year, it is important to know and remember the name STATLER.

Hotels Statler

BUFFALO 450 Rooms 450 Baths
DETROIT 1000 Rooms 1000 Baths
CLEVELAND 1000 Rooms 1000 Baths
ST. LOUIS 650 Rooms 650 Baths

When you get to the States you will find it a convenience to let the first Statler-operated hotel at which you stop make further hotel reservations for you, and provide you with an introduction to the other houses under the same management. It will cost you no more to live in these good hotels than in other houses of the first class.

Hotel Pennsylvania

NEW YORK

Opp. Pennsylvania Terminal—**The Largest Hotel in the World**—2200 Rooms, 2200 Baths

NIPPON MENKWA
KABUSHIKI KAISHA

(THE JAPAN COTTON TRADING CO., LTD.)

LARGEST IMPORTERS AND EXPORTERS
IN THE FAR EAST

COTTON
COTTON YARN
COTTON PIECE GOODS
RAW SILK
WOOL
GENERAL COMMISSION MERCHANTS

Established 1892

HEAD OFFICE: No. 10 2-Chome, Nakanoshima, OSAKA, JAPAN
SHANGHAI OFFICE: 8 Hankow Road
TIENTSIN OFFICE: 42 Rue de France, French Concession

Capital Subscribed- - - - - - - - - - -	Yen 50,000,000.00
Capital paid-up - - - - - - - - - - -	Yen 20,250,000.00
Reserve Funds - - - - - - - - - - -	Yen 26,825,000.00

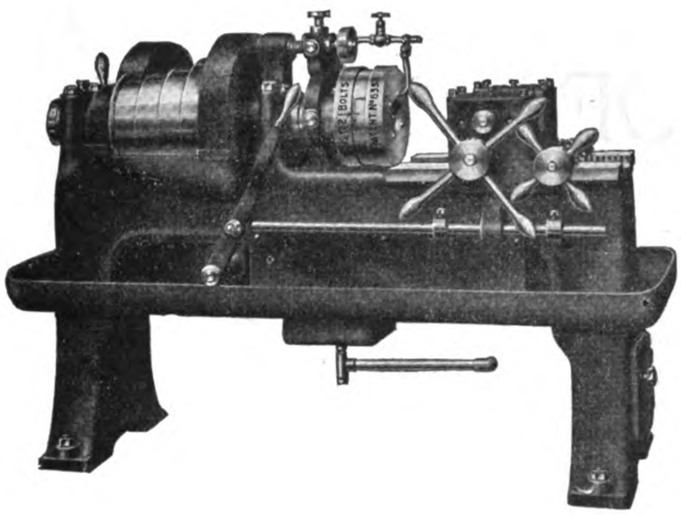
MATAZO KITA, Esq., *President*
ATUSHI YAMADA, Esq., *Vice-President*

Directors :

K. SUYEYOSHI, Esq. G. IMAMURA, Esq. R. NAKAMURA, Esq.
H. OHOKA, Esq. T. SHIKATA, Esq. K. KUSUMOTO, Esq.
T. YASUI, Esq.

BRANCHES: Semba (Local), Dairen, Shanghai, Hankow and Bombay
AGENCIES: Kobe, Yokohama, Tokyo, Seito, Tientsin, Newchwang, Tiehling, Changchung, Harbin, Hongkong, Calcutta, Karachi, Rangoon, Alexandria, Liverpool, New York and Buenos Aires
SOLE BUYING AGENCY IN U.S.A.: Japan Cotton Trading Company of Texas, Fort Worth, Texas
SOLE BUYING AGENCY IN COREA: Corea Cotton Trading Company, Limited
FACTORIES: Cotton Press at Hankow, Cotton Gins and Presses in India

Heap's Patent Screwing Machines



are made in all sizes, and suitable for dealing with all classes of work.

The illustration opposite shows our 2in. Patent Automatic Bolt Screwing Machine which is one of a complete line of Single and Multiple Head Machines specially designed for use wherever large quantities of Bolts have to be dealt with in the most expeditious and economical manner.

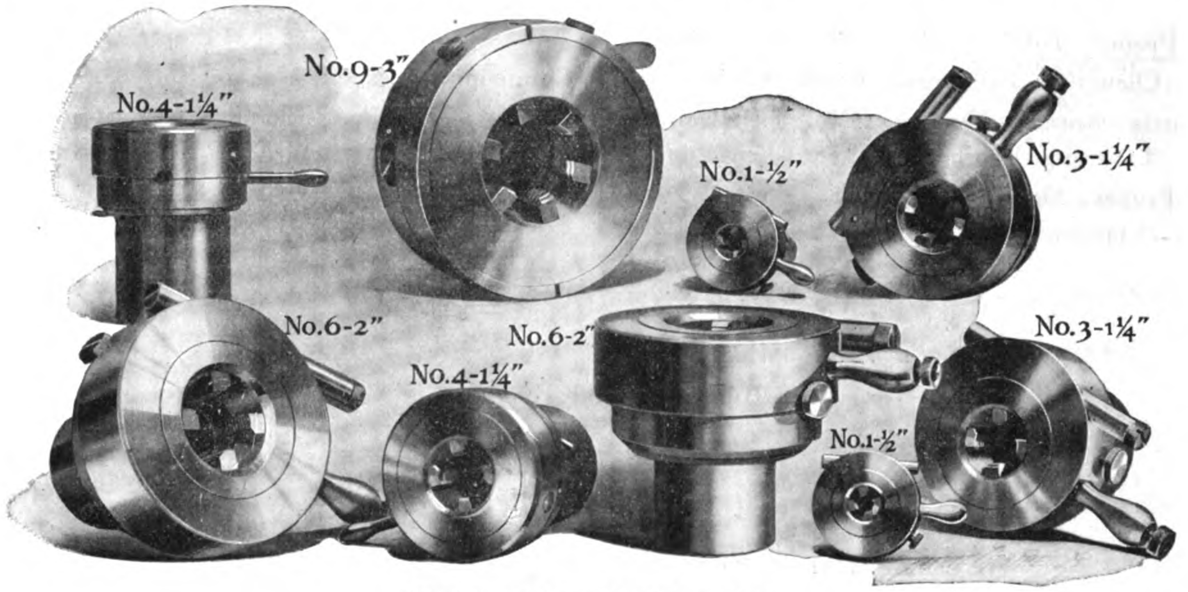
We will gladly advise you as to the most suitable machine for your particular class of work.

Catalogue free on request.

JOSHUA HEAP & CO., LTD.,

ASHTON-UNDER-LYNE, ENGLAND.

The Hartness Automatic Die



THE HARTNESS DIE

A die adopted to general use—for Turret Lathes Automatic Screw Machines.

Capacities 3/32—3"

Complete information gladly sent upon request.

JONES & LAMSON MACHINE COMPANY,

9-10 Water Lane, London, E.C., England.
Cable Address: "Turretorum" London

Springfield, Vermont, U.S.A.
Cable Address: "Turret" Springfield, Vt.

THE BANK OF CHOSEN

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor: S. Minobe, Esq.
Deputy-Governor: T. Kano, Esq.

Directors:

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT: TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY:

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE:

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL - - - - - - - U.S. $5,000,000

SURPLUS AND UNDIVIDED PROFITS - - 10,458,137

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK

LONDON OFFICE: 36 BISHOPSGATE, E.C.

LYONS OFFICE: 27 PLACE TOLOZAN

SAN FRANCISCO OFFICE: 232 MONTGOMERY STREET

BRANCHES:

CHINA
- SHANGHAI
- PEKING
- TIENTSIN
- HANKOW
- HARBIN
- HONGKONG
- CANTON

DOMINICA
- SANTO DOMINGO
- SANCHEZ
- SAN FRANCISCO
- SAN PEDRO
- SANTIAGO
- PUERTO PLATA
- BARAHONA
- LA VEGA

INDIA
- BOMBAY
- CALCUTTA
- RANGOON

JAPAN
- YOKOHAMA
- KOBE

JAVA
- BATAVIA
- SOURABAYA

PANAMA
- PANAMA
- COLON

PHILIPPINES
- MANILA
- CEBU

SPAIN
- BARCELONA
- MADRID

STRAITS SETTLEMENTS
- SINGAPORE

We are also able to offer our Customers the services of the Branches of the National City Bank of New York in the principal countries of South America, Central America and in the West Indies.

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current Accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

H. C. GULLAND, *Manager.*

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital ... ... **Frs. 72,000,000**
Reserves ... ... **„ 70,000,000**

HEAD OFFICE: 96 BOULEVARD HAUSSMANN, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Noumèa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

JUGO GINKO, LIMITED

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugo Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-up Y. 49,750,000 Reserve Funds Y. 23,900,000

***President*: The Hon. Iwao Matsukata *Vice-President*: Masayasu Naruse, Esq.**

***Managing Directors*: Yutsuha Sato, Esq. and Kanesato Aiko, Esq.**

***Head Office Manager*: Sei Usagawa, Esq.**

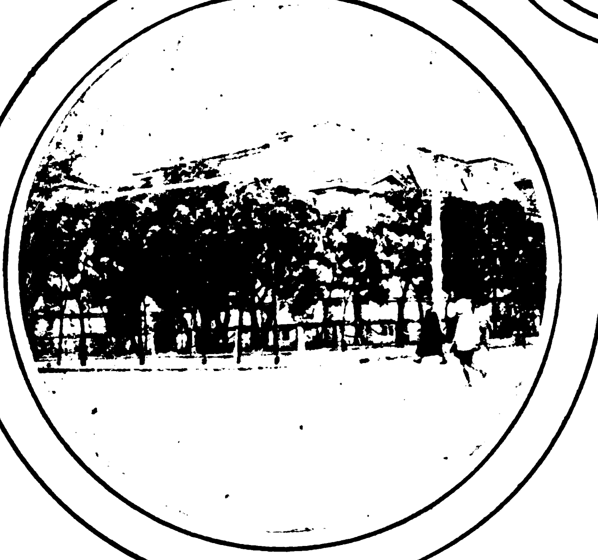
***Head Office*: No. 6, 7chome, Kobiki-cho, Kyobashiku, Tokyo.**

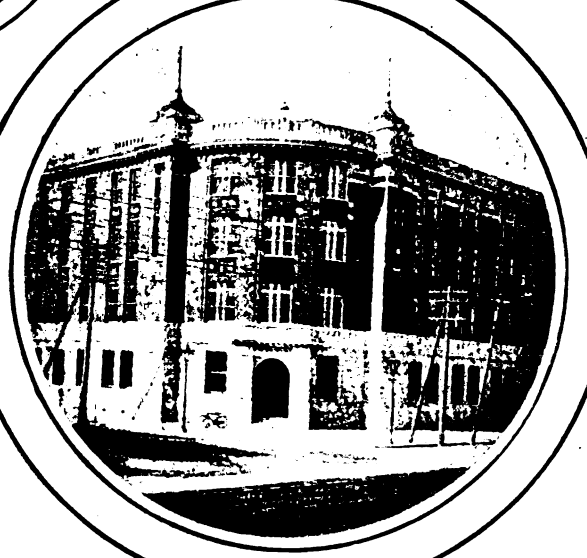
BRANCHES:

SHIMBASHI, MARUNOUCHI, GOFUKUBASHI, TOHORISANCHOME, KAKIGARACHO, NINGYOCHO, RYOGOKU, FUKAGAWA, KANDA (TOKYO). OSAKA, SENBA, TAMATSUKURI, NISHI, KUJO, MINAMI, NAMBA, TENNOJI, KITA, TENGACHAYA (OSAKA), KOBE, SAKAEMACHI, FUKIAI, HYOGO (KOBE). KYOTO, NAGOYA, SAKAI, WAKAYAMA, NISHINOMIYA, OKAYAMA, HIROSHIMA, SHIMONOSEKI, FUKUOKA, KUMAMOTO, KAGOSHIMA, SENDAI.

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD. LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD. UNION DISCOUNT CO. OF LONDON, LTD.





THE BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed	- - - - - - - Yen	60,000,000
Capital Paid-up	- - - - - - - ,,	45,000,000
Reserve Funds	- - - - - - - ,,	9,680,000

President: KOJURO NAKAGAWA, Esq. Vice-President: SHUNROKURO MORI, Esq.

DIRECTORS:

TSUNEKICHI IKEDA, Esq.
GUNJI KAWASAKI, Esq.
TADASU HISAMUNE, Esq.
KUMEMATSU MORINAGA, Esq.
MASUMI ESAKI, Esq.

Head Office: TAIPEH, FORMOSA (TAIWAN)

BRANCHES:

JAPAN: Tokio (General Affairs Department), Kobe, Moji, Osaka, Yokohama.
TAIWAN: Keelung, Tainan, Takow, and 11 other points.
CHINA: Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

AGENTS AND CORRESPONDENTS:

In the Principal Cities and Towns throughout the World.

LONDON BANKERS:

BARCLAYS BANK, LTD. LLOYD'S BANK, LTD. LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.

TOKYO BRANCH:

No. 1, Eiraku-cho Ni-chome, Kojimachi-ku.

Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED - - - - - - Yen 50,000,000

HEAD OFFICE:
MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:
TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President — Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director — T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:
NAGATANE SOMA, Esq. — KINTARO HATTORI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

THE SUMITOMO GOSHI-KAISHA

OSAKA, JAPAN

OWNERS OF BESSHI COPPER MINE, COAL MINES, SILVER AND GOLD MINES, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper, Brass, Bronze and other Alloys, Solid and Drawn Steel Tubes, Nails, Etc.—Superphosphate and Composite, Manure, Sulphuric and Nitric Acid, etc.

GENERAL WAREHOUSE BUSINESS AND FORESTRY ENTERPRISES

WORKS AND DEPARTMENTS

Warehouses ... ... Osaka, Kobe & Tokyo
Mining Offices ... ... Besshi, Wakamatsu, Sapporo & Ohgayu
WORKS:
Copper Works ... ... Osaka
Fertilizer Works ... ... Niihama
Sales Departments .. .. Osaka, Kobe, Tokyo, Kure, Yokosuka, Hakata, Shanghai, Hankow and Tientsin

THE SUMITOMO STEEL WORKS, LTD.

OSAKA, JAPAN

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of Every Description for Railways, Shipbuilding Yards, Mines, Hydraulic Electric and Other Engineering Works, etc., etc.

THE SUMITOMO ELECTRIC WIRE & CABLE WORKS, LIMITED

OSAKA, JAPAN

MANUFACTURERS OF

Copper, Brass, Bronze and Nickel Wires and Strips, Trolley Wires, Insulated Wires and Cables of Every Description for Telephone, Telegraph, Lighting, Power Transmission, etc., etc.

THE SUMITOMO BANK, LIMITED

Head Office: OSAKA, JAPAN
Cable Address: "SUMITBANK"
President: Baron K. SUMITOMO
Established March, 1912
(Successors to The SUMITOMO BANK)

Capital Subscribed ... ... Yen 70,000,000
Capital Paid-up ... ... „ 50,000,000

Reserve Fund ... ... Yen 23,100,000
Deposits .. .. „ 369,000,000

Head Office: Kitahama, Osaka
City Offices: Semba, Bingomachi, Nakanoshima, Dotonbori, Kawaguchi, Tenma, Nipponbashi.
Home Branches: Tokyo (Tokyo, Toriaburacho, Fukagawa, Shinbashi, Asakusa), Yokohama, Nagoya, Kyoto (Kyoto and Nishijin), Kobe (Kobe and Hyogo), Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Wakamatsu, Kokura, Hakata and Kurume.

Foreign Branches: Shanghai, Hankow, Bombay, London, New York and San Francisco.
Agents: The Sumitomo Bank of Hawaii, Ltd., Honolulu, Lloyds Bank, Ltd., London, National City Bank of New York, New York.
Correspondents: In all important places at home and abroad.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

CHAIRMAN:

Mr. Manzo Kushida

MANAGING DIRECTORS:

Mr. Mikitaro Kikuchi Mr. Kiyoshi Sejimo
Mr. Takeo Kato

HEAD OFFICE:

No. 3 Yayesucho Nichome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

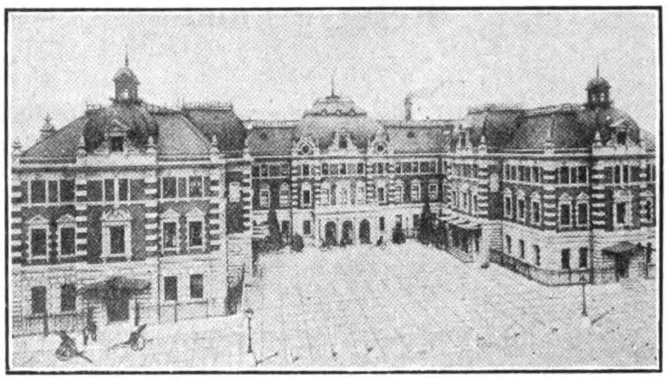
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Semba (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for the Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed... ....Y. 100,000,000.00
Capital Paid-Up.....................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

NIHONBASHI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.
New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.
Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.
Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital - - -	Yen 50,000,000.00
Paid-Up Capital - - - -	Yen 36,350,000.00
Reserve Fund - - - -	Yen 33,500,000.00

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:
No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.
T. AKASHI, *Manager*

CITY BRANCHES:
ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:
YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:
SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:
The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE ONE HUNDREDTH BANK, LTD.

(DAI HYAKU GINKO)

HEAD OFFICE, AWOMONO-CHO, TOKYO

TOKYO BRANCHES: No. 1 Torihatagocho, Nihonbashi: No. 10, Ginza Nichome, Kyobashi
YOKOHAMA BRANCH: Nos. 53-55 Honcho Shichome
OSAKA BRANCH: 28 Bingo-machi, Nichome
KYOTO BRANCH: Shijo Higashinotoin
SHINMACHI BRANCH: Shinmachi Dori Sanchome

President: K. IKEDA, Esq.

Managing Director: S. CHOH, Esq.

SUBSCRIBED CAPITAL - - - -	Yen 25,000,000
CAPITAL PAID-UP - - - - -	Yen 17,500,000
RESERVE FUND - - - - -	Yen 8,094,340
DEPOSITS - - - - - - - -	Yen 110,740,264

Transacts General Banking and Foreign Exchange Business. Conducts Trust Company Business

Hongkong and Shanghai Banking Corporation

Paid-up Capital	...	$20,000,000
Reserve Funds:	Sterling ...	£4,500,000
	Silver ...	$23,500,000
Reserve Liability of Proprietors	...	$20,000,000

Court of Directors:

G. M. DODWELL, Esq., Chairman

Hon. Mr. A. O. LANG, Deputy Chairman

D. G. M. BERNARD, Esq.

G. T. M. EDKINS, Esq.

P. H. HOLYOAK, Esq.

Hon. Mr. E. V. D. PARR

W. L. PATTENDEN, Esq.

A. M. BOWES SMITH, Esq.

H. P. WHITE, Esq.

Head Office:

HONGKONG

Chief Manager:

HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:

LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund

Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY	LONDON
BANGKOK	LYONS
BATAVIA	MALACCA
BOMBAY	MANILA
CALCUTTA	NAGASAKI
CANTON	NEW YORK
CHEFOO	PEKING
COLOMBO	PENANG
DAIREN	RANGOON
FOOCHOW	SAIGON
HAIPHONG	S. FRANCISCO
HAMBURG	SHANGHAI
HANKOW	SINGAPORE
HARBIN	SOURABAYA
ILOILO	SUNGEI PATANI
IPOH	TIENTSIN
JOHORE	TSINGTAO
KOBE	VLADIVOSTOCK
KUALA LUMPUR	YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

A Bank with 700 Branches.

YOUR BUSINESS in Canada, Central and South America, Cuba and throughout the West Indies can be promptly and efficiently handled by our branches in these countries. We shall be pleased to act as your correspondent for Letters of Credit, &c.

The Royal Bank of Canada

HEAD OFFICE: MONTREAL.

600 branches in Canada and Newfoundland.
100 branches elsewhere.

LONDON, ENG. **NEW YORK, U.S.A.**
PARIS, FRANCE. **BARCELONA, SPAIN.**

The First National Bank of Boston

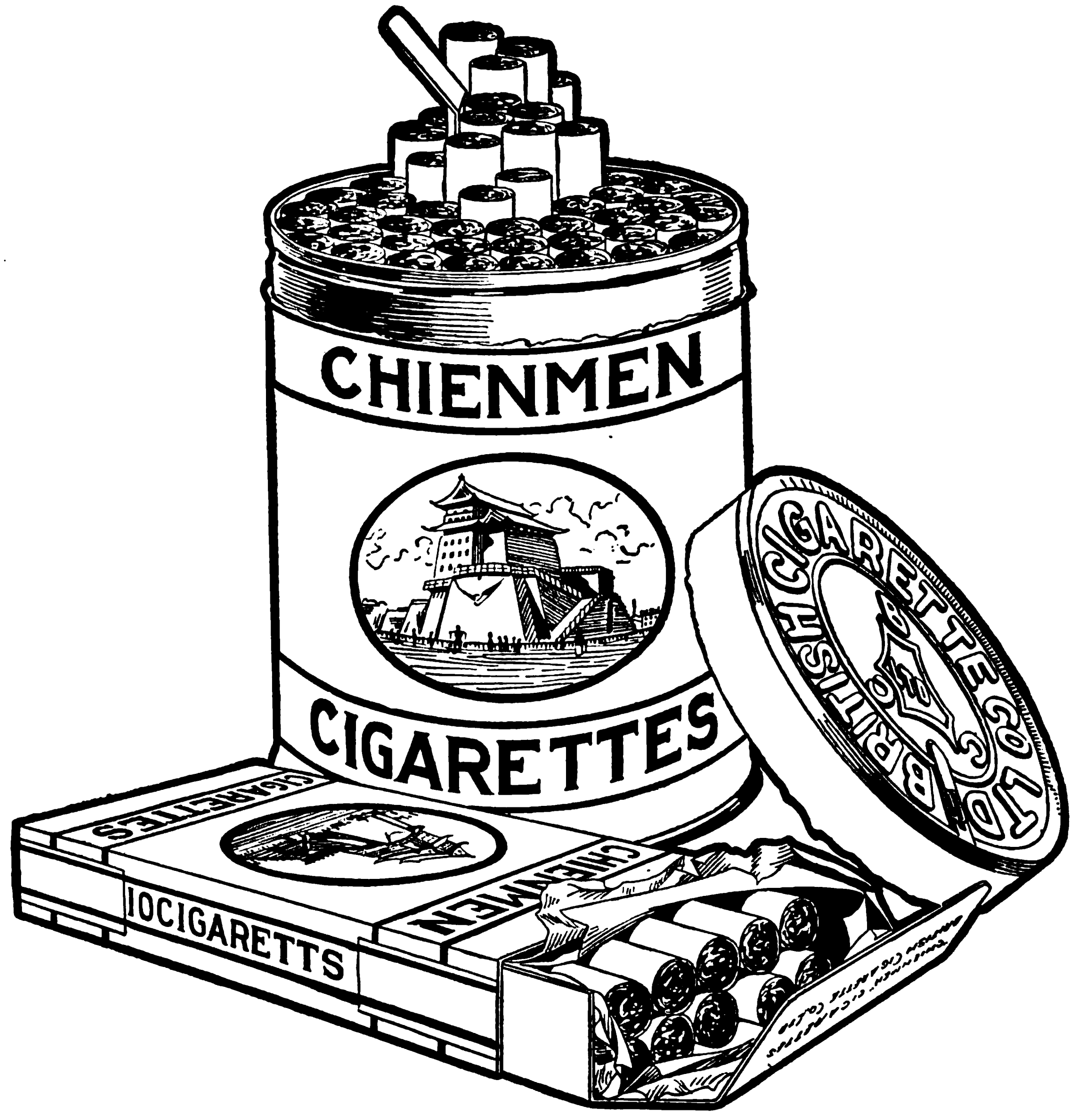
The leading financial institution of New England

Foreign and domestic commercial banking of every nature.

Correspondence solicited.

CHIENMEN

Cigarettes



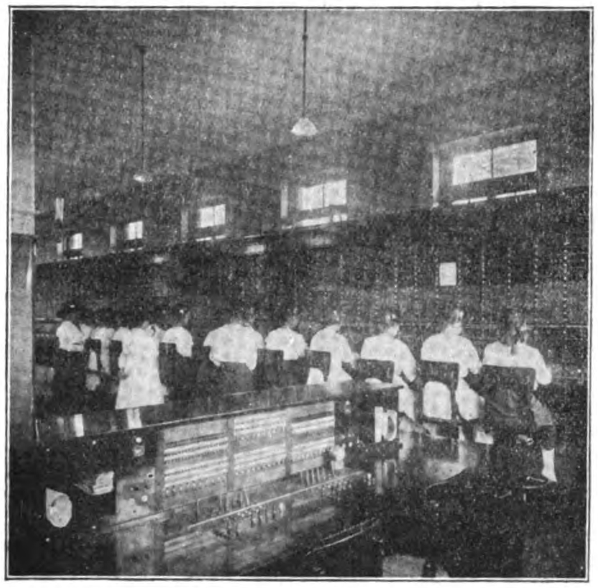
A brand well known to the "High Grade Cigarette Smoking Public" of China.

BRITISH-AMERICAN TOBACCO CO. (CHINA), LTD.

Distributors

Kellogg Telephones and Switchboards

Used Throughout the World



IF you need new or additional telephone equipment, you are chiefly interested in buying a standard make that is of proven efficiency and reliability. For over twenty years Kellogg telephones have been operating in South America and other countries. In the United States of North America over three million Kellogg transmitters are in service today.

In South America are a large number of Kellogg exchanges and many telephones, the number we are selling is constantly increasing.

In the cities of South America in which the Kellogg Company has telephone and switchboard apparatus operating we mention the following:

Rio de Janerio, Brazil (4 large exchanges)	Calleo, Peru
Quito, Ecuador	Sao Paulo, Brazil
Lima, Peru	Bahia, Brazil

South American purchasers who are acquainted with Kellogg equipment know that they can depend on the ability of the Kellogg Switchboard & Supply Company to provide them with equipment most satisfactory for their requirements and at a reasonable cost. In judging telephone service, we say, "Use Is the Test."

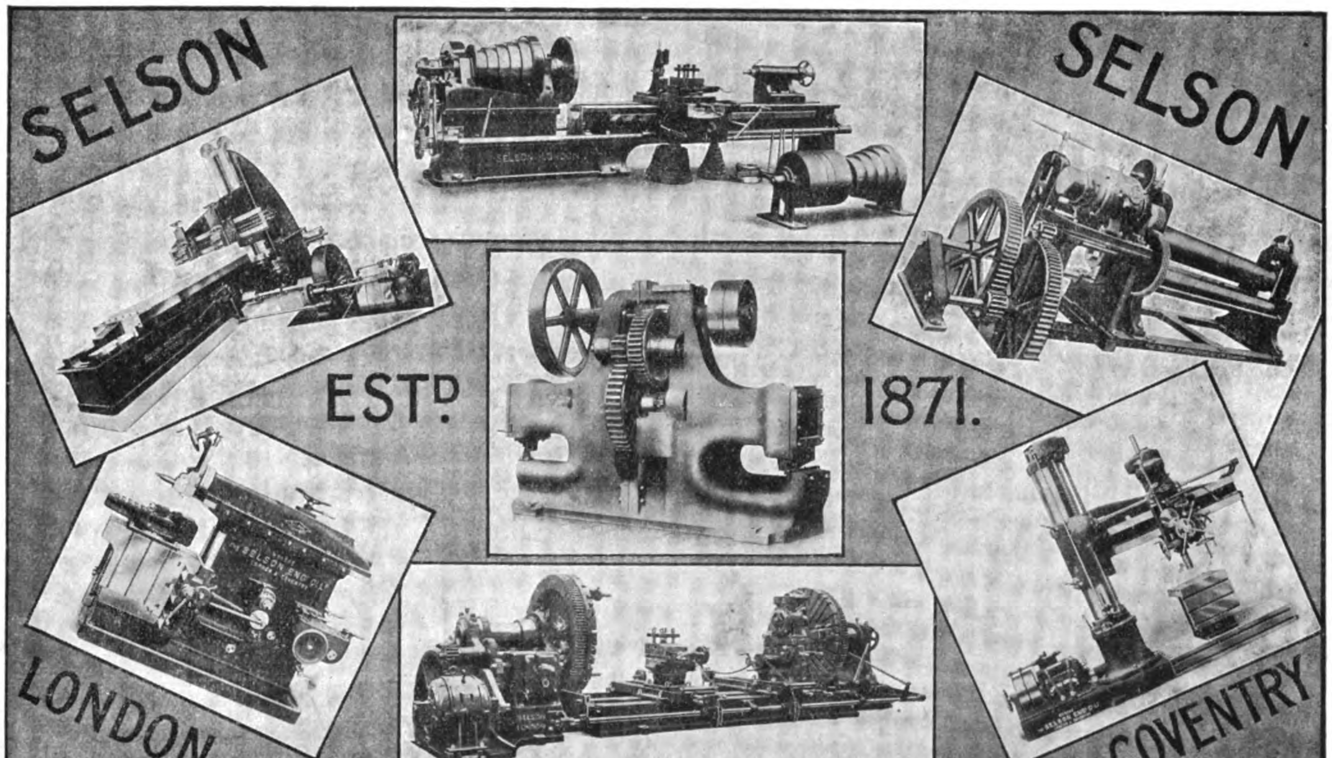
KELLOGG SWITCHBOARD AND SUPPLY COMPANY

Far Eastern Branch, No. 62 Kiangse Road, Shanghai

General Offices and Factory, Chicago, U. S. A.

Manufacturers of standard telephone equipment

We always have in stock a dependable supply of apparatus parts for additions or replacements, supplies for telephone lines, wire, hardware, tools, telephone equipment, etc.



83 & 85 Queen Victoria Street, London, E.C. 4   Cable Address: "SELSONEER" London

SOUTH MANCHURIA RAILWAY

MANCHURIA AND CHOSEN LINES

Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul and Dairen and Changchun), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least twice a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

SOUTH MANCHURIA RAILWAY COMPANY

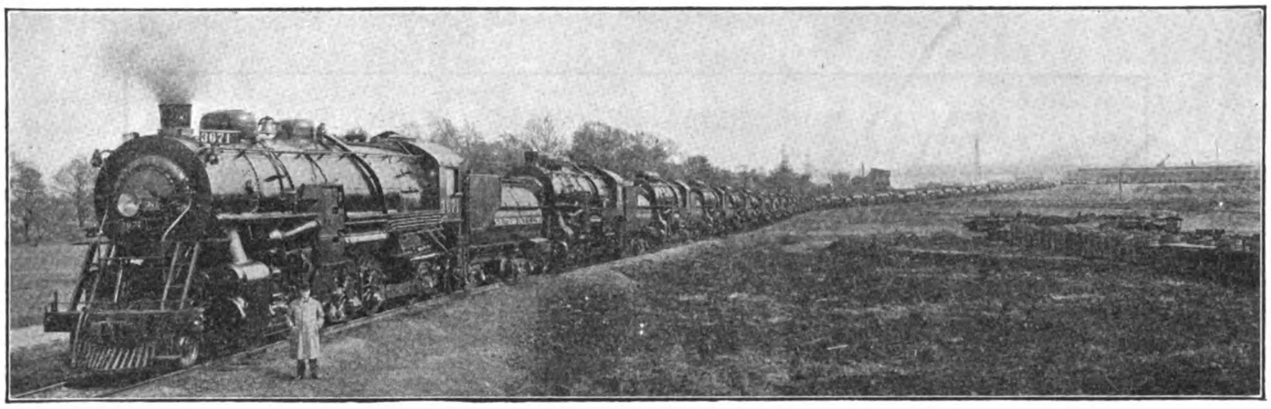
Head Office: DAIREN

Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

Telegraphic Address: MANTETSU or SMRCO. Codes: A.B.C. 5th & 6th Editions, A1 Lieber's, and Bentley's

BALDWIN

World's Heaviest Train of Big Locomotives Moved Across the United States of America



IN railroad circles throughout the world, much interest was shown in the recent movement of a train of twenty 2-10-2 type, oil burning locomotives, from these Works on the Atlantic Coast across the United States, to the Pacific Coast.

We recently built fifty of these most powerful type of locomotives for the Southern Pacific Lines and all will be in service this year, handling rapidly increasing traffic.

The principal dimensions of these locomotives are: Cylinders, 29½ by 32 inches. Working pressure, 200 pounds. Driving wheels, diameter, 63½ inches. Total length, engine and tender, 97 feet 3¼ inches. Weight in working order, engine, 398,000 pounds. Total weight, engine and tender, 621,000 pounds. Tractive force, 75,150 pounds.

We are prepared to design and build locomotives for any railway in the world and make prompt deliveries.

SALE & FRAZAR, LTD., Tokyo and New York
J. M. WRIGHT, Bandoeng, Java, D. E. I.
C. BREWER & CO., LTD., Honolulu, Hawaii
NEWELL & CO., Melbourne, Victoria
ANDERSEN, MEYER & CO., LTD., Shanghai and New York
PHILLIPS & PIKE, Wellington, New Zealand
R. TOWNS & CO., Sydney, New South Wales
LESLIE & CO., Perth, Western Australia
PACIFIC COMMERCIAL CO., Manila, P. I., and New York
J. W. KELKER, Harbin, Manchuria

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U.S.A.
Cable Address: "Baldwin, Philadelphia"

819

LOCOMOTIVES

JAPANESE GOVERNMENT RAILWAYS

THOROUGHLY EQUIPPED LINES REACH EVERY PLEASURE RESORT AND BUSINESS POINT

Reserved Cars, Private Cars, Special Trains on Previous Arrangement for Tourists' Parties of all Sizes

WELL-FURNISHED PASSENGER CARS WITH SLEEPING AND DINING ACCOMMODATION ON THROUGH TRAINS AND EXPRESSES

TWO MOST RELIABLE ORGANIZATIONS FOR TRAVELLERS

1. JAPAN TOURIST BUREAU
   Peking Office: Morrison Road, Peking
   Head Office: Tokyo Station, Tokyo, Japan
2. JAPAN HOTEL ASSOCIATION
   c/o Traffic Bureau, Japanese Government Railways

For Particulars, Time-Tables, Guide Books, etc., please apply to
TRAFFIC BUREAU, DEPARTMENT OF RAILWAYS, TOKYO, JAPAN

THROUGH BOOKING TO AND FROM

CHINA

Single and Return Tickets between China and Japan via Chosen
Period of Validity: Single, 40 days: Return, 110 days. 20% Reduction for Return Tickets

China-Japan Party Trip Tickets
Period of Validity: Two months. Reduction: 25%-50% for 10 or more passengers

China-Japan Circular Tour Tickets
Period of Validity: Four months. Reduction: 30% for Railway; 25% for Steamer

China-Japan Parcel Through Traffic
Parcel through conveyance between the principal stations in China and Japan viâ Chosen at low rates

OFFICIAL GUIDE-BOOKS TO EASTERN ASIA—ISSUED BY THE JAPANESE GOVERNMENT RAILWAYS, TOKYO, JAPAN.

			In the Far East
Vol.	I.	Chosen, Manchuria, Siberia ... (Revised Edition)	10 Yen
,,	II.	South-Western Japan	5 Yen
,,	III.	North-Eastern Japan...	5 ,,
,,	IV.	China (Revised Edition)	10 ,,
,,	V.	East Indies	7 ,,

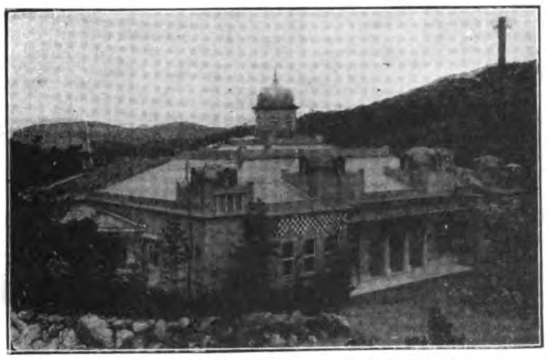
On sale at the best bookstores and principal tourist agencies in the United States, Canada, Great Britain, the principal Continental countries, and throughout the Far East.

"THE HOT SPRINGS OF JAPAN"

(AND THE PRINCIPAL COLD SPRINGS)

INCLUDING

CHOSEN (Korea); SOUTH MANCHURIA; TAIWAN (Formosa)



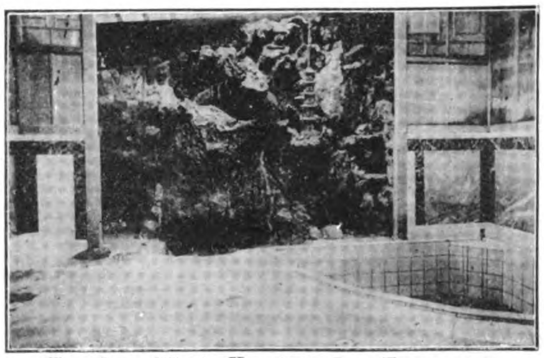
Arima. Radium Spring Bath-house

OFFICIAL SERIES

Issued by the

JAPANESE GOVERNMENT RAILWAYS,

Tokyo, Japan



Fan-shaped Bath, Kansiu-ro Inn, Tonosawa, in Hakone

A standard and comprehensive book that is a mine of information on hot springs, including analyses, lists of diseases *benefited* by the different classes of springs (diseases *prohibited* are also given), the routes to the springs, available hotel accommodations, places of

Owakidani or Ojigoku ("Big Hell") in Hakone

interest at and near the resorts.

The book explains the action of the water on the human body, and contains other valuable and interesting information, including data, etc., of mineral springs in the principal countries of the world, and of radium springs.

Much of the information is applicable to mineral springs anywhere

504 PAGES; 196 ILLUSTRATIONS; 2 COLORED LITHOGRAPHS; 15 MAPS, SPECIALLY DRAWN

The book slips into the pocket easily. Price: 7 *Yen* in the Far East

The bookstores of the United States and Canada are supplied through Messrs. O. P. Putnam's Sons, 5 West 45th Street, New York. Those of Great Britain and the Continent through Messrs. G. P. Putnam's Sons, 24 Bedford Street, Strand, London, W.C. 2.

ON SALE IN THE FAR EAST

At all offices of Japan Tourist Bureau: Tokyo, Yokohama, Kobe, Nagasaki, and at Seoul, Tsingtau, Dairen, Harbin, Peking, etc.

At Kelly & Walsh: Yokohama, Shanghai, Hankow, Hongkong, Singapore.

Open Air Hot Spring Bath at Hsiung-yao-cheng, South Manchuria

At the Philippine Educational Co., Manila.

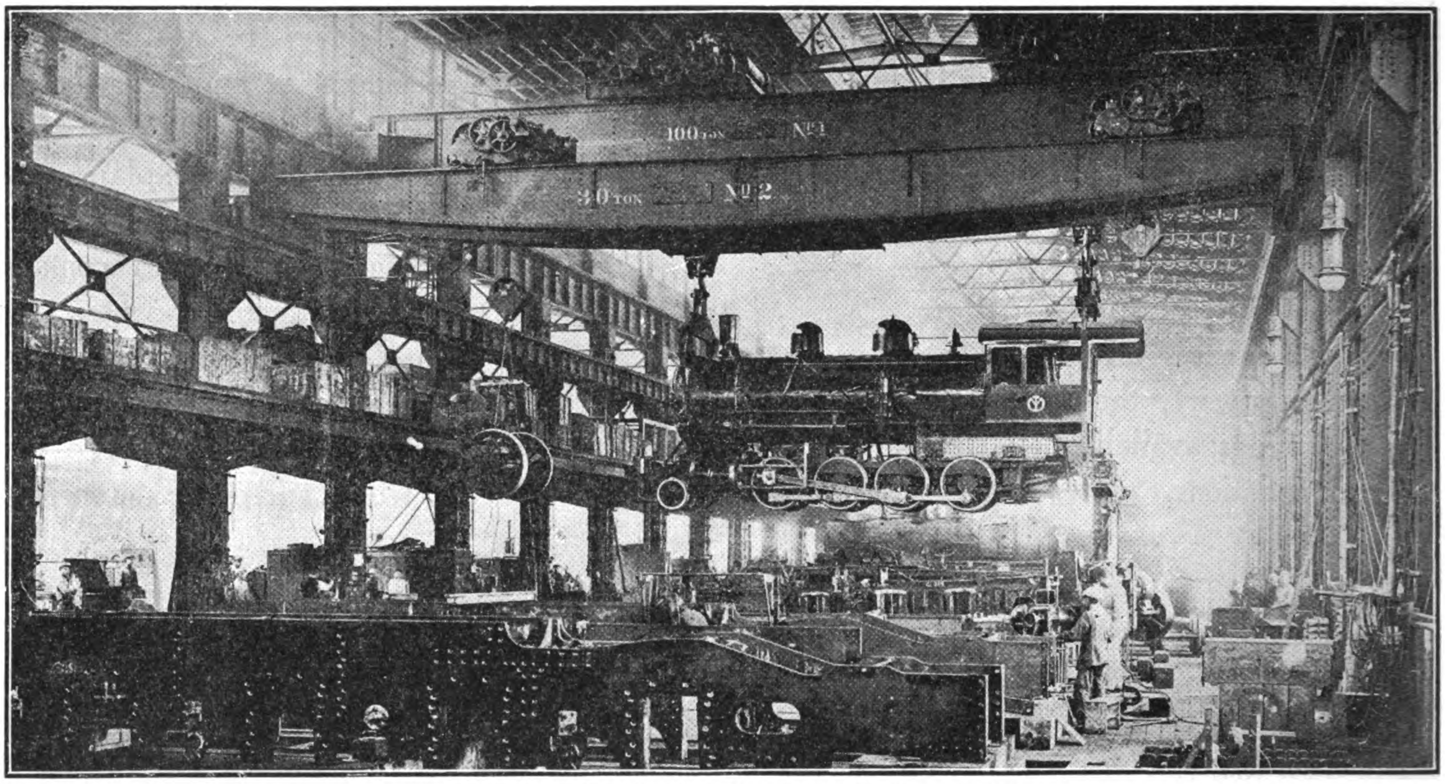
At the leading bookstores in Tokyo and elsewhere in Japan and in China.

At the principal Thos. Cook & Son's offices throughout the World.

SOUTH MANCHURIA RAILWAY

RAILWAY

SHAKAKO WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

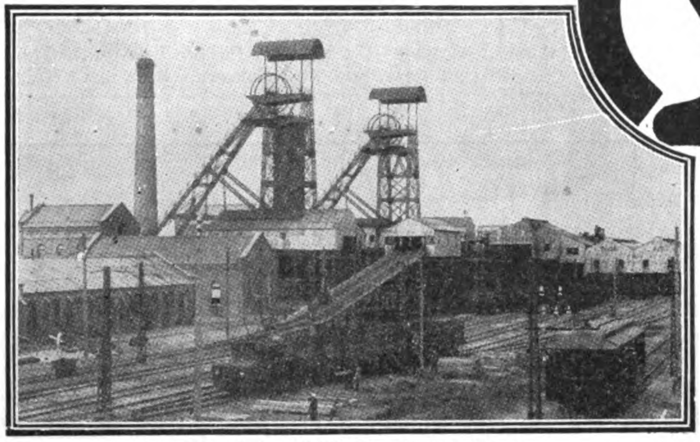
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

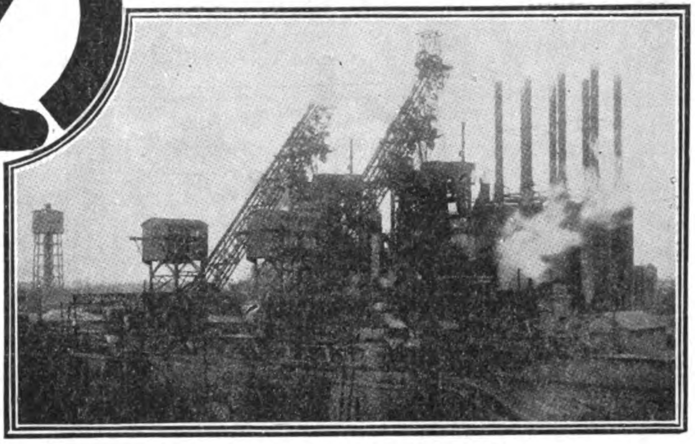
THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON



Togo Pit of the S.M.R. Fushun Collieries



Anshan Steel Works of the S.M.R.

FUSHUN COAL

The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

Depots:

Dairen, Port Arthur, Newchwang (Yingkou), Tientsin, Tsingtao

Agencies:

Chefoo, Takao (Formosa), Osaka, Manila, Nagoya, Hongkong, Batavia, Shanghai, Sourabaya, Yokohama, Moji, Singapore, South Seas, Saigon, Penang, Niigata, etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day) Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day) Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

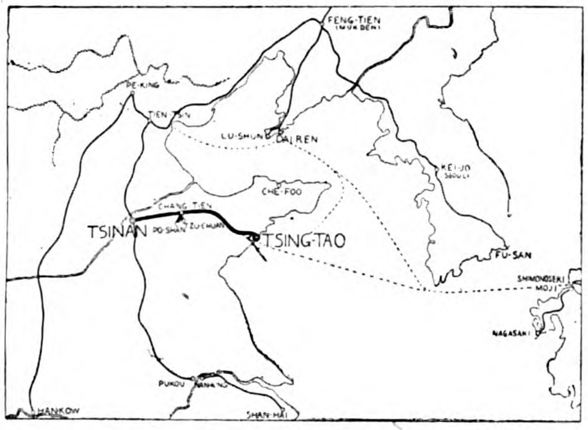
A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

BUT THE TWAIN HAS MET AND BLENDED HERE

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.

For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.

Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway.

At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.

The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1 leaves Tsingtao daily 10.00 p.m. arrives Tsinan 8.00 a.m.
Train No. 3 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.40 p.m.
Train No. 2 leaves Tsinan daily 11.00 p.m. arrives Tsingtao 8.35 a.m.
Train No. 4 leaves Tsinan daily 10.10 a.m. arrives Tsingtao 8.20 p.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30; 2nd class, $7.20.

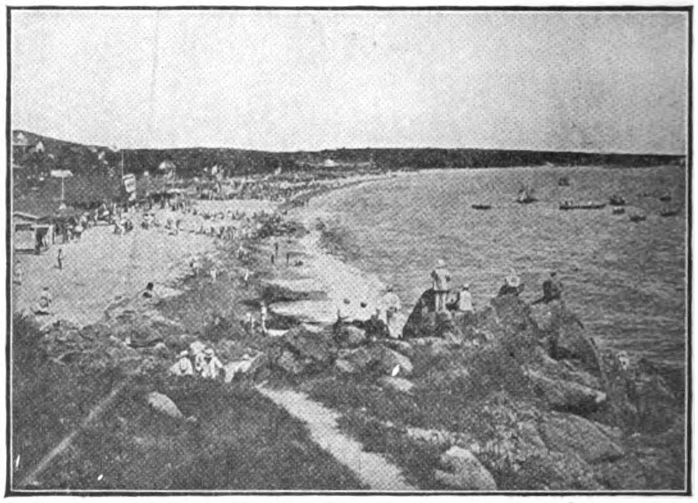
First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.



BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

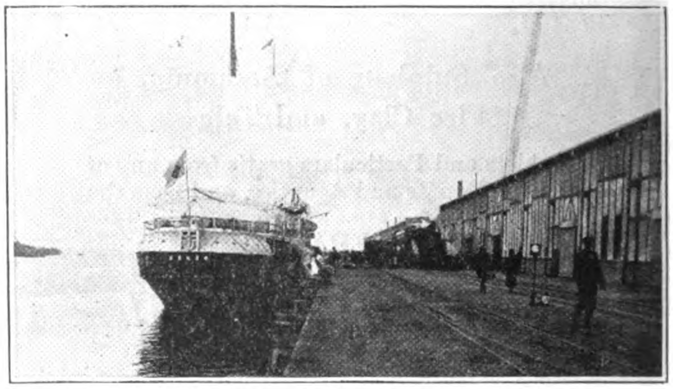
The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.



THE GREAT HARBOUR, TSINGTAO

For Further Information, please apply to

THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

SUPERHEATERS

ELESCO

STEAM SUPERHEATERS for Locomotive, Industrial and Marine Service
Feed Water Heater Equipment for Locomotives

Boiler Feed Pumps — Pipe Coils

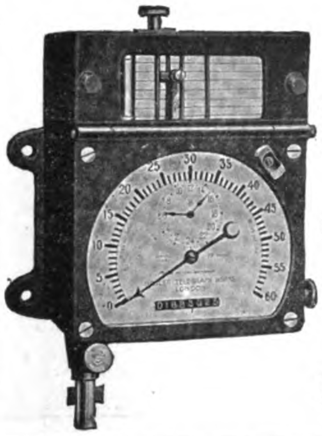
Designing Engineers and Manufacturers

THE SUPERHEATER COMPANY

General Offices: 17 East 42nd St., New York, U.S.A.

THE BEST LOCOMOTIVE SPEED INDICATORS & RECORDERS

WITH CONJUGATE MOVEMENT



TELOC TYPE

Chart Feed on a Mileage Basis of 10 m/m per Mile.

INDICATES:—Speed.
Total mileage since application of Instrument.
Total mileage of each run.
Time of Day in Hours and Minutes.

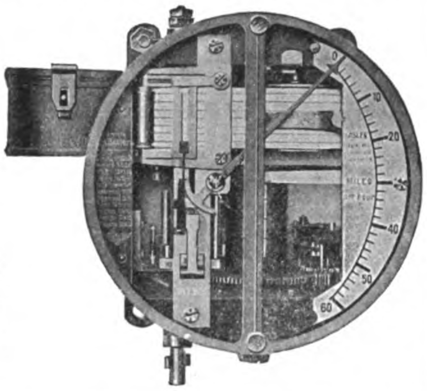
RECORDS:—Speed attained at any point of run.
Time the engine or coach is at work.
Distance covered.
Duration (up to 24 hours) and point of stops.
Time of Day in Hours and Minutes.
If desired apparatus to record working of Westinghouse or Vacuum Brakes.

HASLER TYPE

Chart Feed on a Time Basis of 4 m/m per Minute.

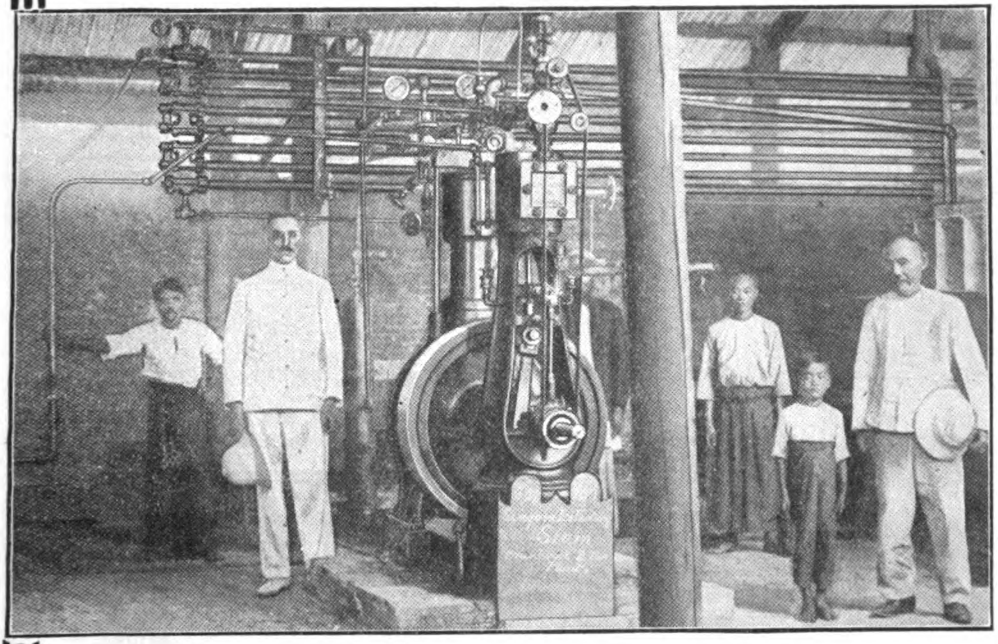
INDICATES:—Speed.

RECORDS:—Speed attained at any point of the run.
Time the engine or coach is at work.
Distance covered.
Duration and point of stops.
If desired bell can be fitted to ring at predetermined speed, or apparatus to record working of Westinghouse or Vacuum Brakes.



HASLER TELEGRAPH WORKS, 26 VICTORIA STREET, LONDON, S.W. 1.

Agents in China: WILLIAM FORBES & CO., PEKING.



Brunswick Refrigeration

has won world-wide popularity and success.

There is hardly a country in which you will not find some notable example of the Brunswick Equipment, purchased years ago and still operating efficiently.

To the left is shown the first

Brunswick Plant in Siam

This plant was furnished the Singora Ice Factory in 1911. It is still functioning successfully and its satisfactory service has influenced the ordering of many other machines. Long, continuous, economical service is the best proof of heavy and rugged construction.

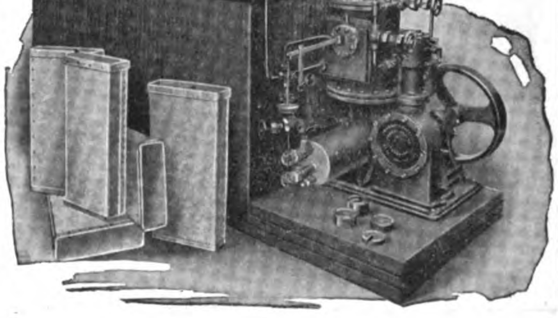
We want you to know more about the Brunswick machines.

Brunswick—Kroeschell Co.

Dept. 2, New Brunswick, N.J., U.S.A.

We call attention to our standard portable ice-making plant shown opposite. Produces 250-lbs. of ice daily. Shipped complete and ready to make ice as soon as charged with ammonia and connected to power and water supply. Also in capacities up to six tons daily.

BRUNSWICK



A. J. MORSE & SON, Inc.

221 High St., Boston, Mass., U.S.A.

Established 1837

DIVING APPARATUS

Special Apparatus built to order

FRANK L. STRONG, *Agent—24 Calle Echague, Manila, P.I.*

PUBLISHED ANNUALLY

THE LONDON DIRECTORY

with Provincial & Foreign Sections,

enables traders to communicate direct with

MANUFACTURERS & DEALERS

in London and in the Provincial Towns and Industrial Centres of the United Kingdom and the Continent of Europe. The names, addresses and other details are classified under more than 2,000 trade headings, including

EXPORT MERCHANTS

with detailed particulars of the Goods shipped and the Colonial and Foreign Markets supplied ;

STEAMSHIP LINES

arranged under the Ports to which they sail, and indicating the approximate Sailings.

One-inch BUSINESS CARDS of Firms desiring to extend their connections or Trade Cards of

DEALERS SEEKING AGENCIES

can be printed at a cost of 30 shillings for each trade heading under which they are inserted. Larger advertisements from £2 to £16.

A copy of the directory will be sent by parcel post for 40 shillings nett cash with order.

THE LONDON DIRECTORY CO., LTD.

25 Abchurch Lane, London, E.C. 4, England

BUSINESS ESTABLISHED 108 YEARS

AWARDED GRAND PRIZE OF HONOUR

PANAMA PACIFIC EXHIBITION, SAN FRANCISCO, 1915.

MOST POPULAR **BEER** IN THE ORIENT

ASAHI YEBISU SAPPORO

BREWED BY

THE DAI NIPPON BREWERY CO., LTD.

HEAD OFFICE: TOKYO

BRANCHES OSAKA, SAPPORO, SEOUL, SHANGHAI, TSINGTAO.

SOLD EVERYWHERE

Agents: MITSUI BUSSAN KAISHA,

China, Straits Settlements, Dutch East Indies, and British India

We are Specialists in the Design, Construction and Application of

FANS

for every conceivable purpose

THE "CYCLONE" Fan is the result of over forty years experience of Ventilating Engineering.

The REGISTERED TRADE MARK CYCLONE

Fan is the Most Reliable & Efficient Ventilating Instrument on the Market

As Installed in Buckingham Palace & the House of Commons. In use in all the leading Industries throughout the world.

Write now for Booklet No. 391.

MATTHEWS & YATES, Ltd., Cyclone Works

Swinton, Nr. Manchester

Transatlantische Handelskompagnie m.b.H.

HAMBURG

Cable address: Handelslot.—Codes: A.B.C. 5th, 6th Bentley, Carlowitz

Speciality Export of :
- Steel Bars, Plates, Girders, Wire, Wire-nails, Hardware, Cutlery.
- All kinds of Paper.
- Drugs & Chemicals & Sundries.

Seeks connections with 1st class buyers or importers.

SUBSCRIBE

TO THE

FAR EASTERN REVIEW

THE ONLY ENGINEERING

PUBLICATION IN THE FAR EAST

THE

North-China Daily News

Established in 1850 as a weekly; in 1870 as a daily

To the Reader

The "North-China Daily News" writes the history of China. It records the pulse of its politics; it reports the conditions of its finance and its markets; and it chronicles the daily doings of its people.

To the Advertiser

The greatest purchasing power in China is that possessed by readers of the "North-China Daily News." It is the newspaper which is found in every office, consular or commercial; it is the newspaper most frequently quoted both by the foreign and vernacular press; and it is the one newspaper which combines a quality with a quantity circulation—being the largest both in size and circulation in China. It was the first newspaper to publish audited circulation statements.

Subscription: Mex. $28 per annum.

(Postage Extra).

The North-China Herald

Is the weekly edition of the "North-China Daily News" for readers abroad. It contains 95 per cent. of news and is the best medium for keeping in touch with events in China when out of reach of the daily.

Subscription: Mex. $16 per annum.

(Postage Extra).

Copies of either of the above publications will be sent to anyone interested on request.

NORTH-CHINA DAILY NEWS & HERALD, LTD.,
Shanghai.

Telegraphic Address: "Herald Shanghai."—All Codes.

A NORTH-CHINA TRADE DIRECTORY

The North China Desk Hong List

Is the only Trade Directory of North China issued twice a year. Its information is the most accurate and complete. Published regularly since 1865 it has grown to 900 pages. In addition to the names and addresses of every foreign firm, resident, and missionary in China it contains the following classified information:—

SHANGHAI HONG LIST.—All firms, institutions, missions, consulates, etc., in Shanghai, with staffs, arranged alphabetically.

TRADE DIRECTORY.—A list of all Shanghai firms under their professional or trade headings.

AGENCIES.—Agencies held by Shanghai firms are listed alphabetically, with the firm's name after them.

STREET DIRECTORY.—A list of the streets of Shanghai in English and Chinese, with the occupants of all foreign and many Chinese houses, offices, and stores.

SHANGHAI WHO'S WHO.—An alphabetical list of the men of Shanghai, with their business addresses.

RAILWAYS.—A list of the Northern Railways of China, with their foreign and native staffs, including those resident in Shanghai.

RESIDENTIAL DIRECTORY.—A complete list of the foreign residents of Shanghai, arranged alphabetically, with their private addresses.

OUTPORT HONG LIST.—A list of Northern and Central China cities and outports with foreign firms and institutions and their staffs.

OUTPORT WHO'S WHO.—An alphabetical list of foreign men in Northern and Central China, compiled from the Outport and Railway Sections of this work.

OUTPORT LADIES' LIST.—An alphabetical list of foreign ladies, not engaged in mission work, resident in Northern and Central China.

OUTPORT MISSIONARIES.—Classified alphabetically by provinces. Under the names of the provinces are given the towns where missions are established, with list of residents. This is divided into two sections: (1) Protestants, (2) Roman Catholics. Mission Institutions, such as Schools, Colleges, etc., will be found under the respective Ports in which they are instituted.

MISSIONS WHO'S WHO.—An alphabetical list of missionaries of each denomination, compiled from the previous section.

GENERAL.—Consular, postal, exchange and other information.

PRICES:

Shanghai **$8** with map **$6** without map

On Sale at the Offices of

The North-China Daily News

(Temporary offices during rebuilding)

2B Kiukiang Road, Shanghai

DIAMOND
POWER SPECIALTY CORPORATION

Exclusive Manufacturers in the United States of

DIAMOND
SOOT BLOWERS

For all high-pressure steam boilers.

10340 Oakland Avenue,
DETROIT, MICHIGAN, U.S.A.

PITTSBURGH STEEL CO.

Pittsburgh, Pennsylvania, U.S.A.

Manufacturers of "PITTSBURGH PERFECT"

OPEN HEARTH STEEL PRODUCTS

INCLUDING

Galvanized Wire	Bolt and Rivet Wire
Bright Hard Wire	Galvanized Barbed Wire
Bright Nail Wire	Wire Nails
Annealed Wire	Fence Staples
Bright Soft Wire	

Pig-Iron, Blooms, Billets, Wire Rods, Hard Spring Coil Wire, Twisted Cable Wire, Bale Ties, Steel Hoops, Steel Bands, Cotton Ties and Fabricated Stock, Poultry and Lawn Fencing.

We are prepared to give PROMPT SERVICE, and solicit your inquiries accompanied by complete specifications.

ADDRESS:

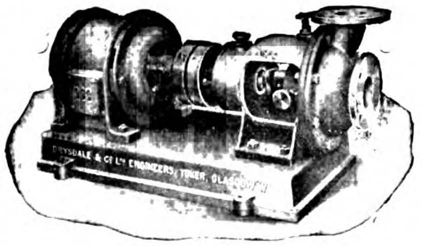
PITTSBURGH STEEL CO.

EXPORT DEPARTMENT:

EQUITABLE BUILDING, NEW YORK, U. S. A.

Cable Address: "PITTSTEEL."

"BON ACCORD" **CENTRIFUGAL PUMPS**



"O" Type Single Suction Electrically Driven Pump

Self-Lubricating Centrifugal PUMPING ENGINES.

MARINE and LAND TYPES for all DUTIES.

HIGH SPEED ENGINES for driving DYNAMOS, FANS, ETC.

Try "Bon Accord" Packing for the Stuffing Boxes of your Pumps and Engines.

DRYSDALE & CO., LD.,
YOKER, GLASGOW, SCOTLAND.

DIXON'S BELT DRESSINGS

It's curious how many people give careful thought to buying good belts—and then let them get into bad condition for lack of a little care. As a matter of fact, nothing so well repays proper attention as a belt. A dry, stiff belt with a hard glassy surface slips and wastes a lot of the power it is supposed to transmit. And when it breaks, and needs to be replaced, there's a loss of output while the line shaft or machine is idle. Here are two products that ought to be in every power plant—they'll soon pay for themselves, many times over, in saving of power, time and belting.

Dixon's Solid Belt Dressing

This is a food, in paste form, for leather belts, applied when the belt is idle. It penetrates to every fibre, makes the belt soft and pliable, restores "Life," gives a surface that clings to the pulley without collecting dirt. It is a splendid protection against water and steam.

This comes in handy sticks, to rub on a running belt, and it's good for any kind of belt. It keeps the belt just right—soft and pliable and adhesive—supplying the needful elements which work out or dry out in service.

The consistent use of these dressings will keep every belt working up to the limit, minimizing belt renewals and keeping everything running right.

Send for Booklet No. 94

"The Proper Care of Belts."

Joseph Dixon Crucible Co.

Established, 1827

For Prices, Information, etc., communicate with

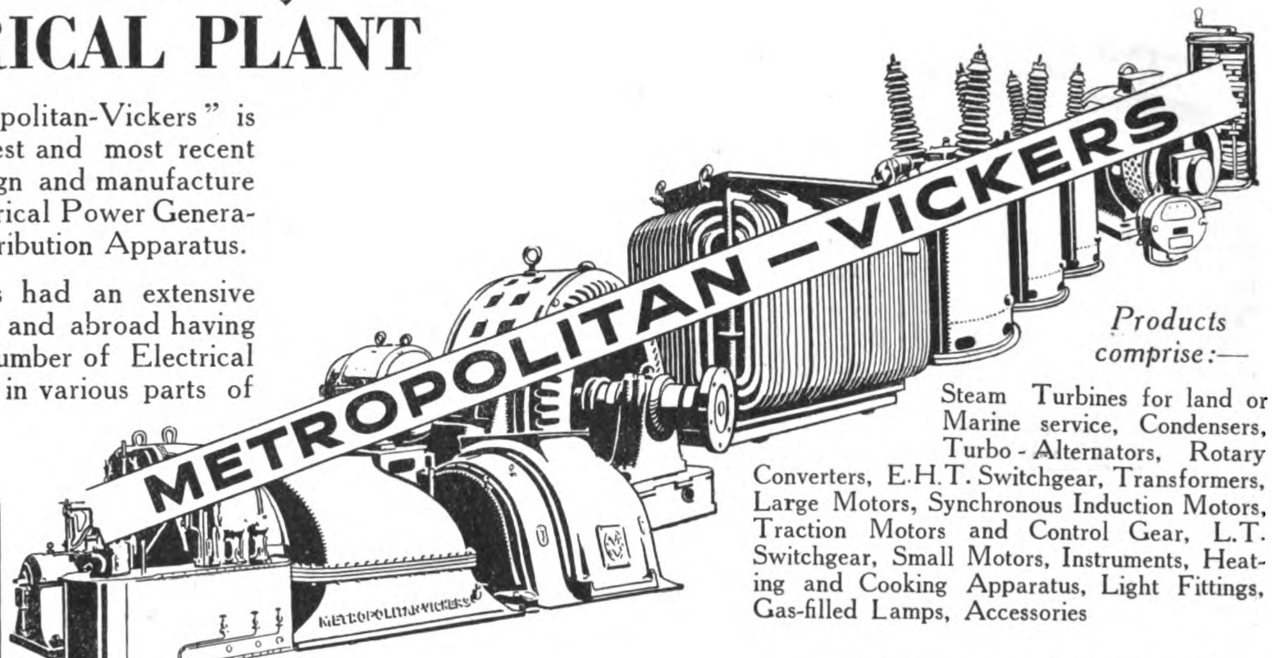
HENRY KATTEN

22 Kiukiang Road Shanghai, China

This name should be on all your ELECTRICAL PLANT

The name "Metropolitan-Vickers" is indicative of the best and most recent practice in the design and manufacture of all kinds of Electrical Power Generation Plant and Distribution Apparatus.

The Company has had an extensive experience at home and abroad having equipped a large number of Electrical Power Installations in various parts of the world.



Products comprise:—

Steam Turbines for land or Marine service, Condensers, Turbo-Alternators, Rotary Converters, E.H.T. Switchgear, Transformers, Large Motors, Synchronous Induction Motors, Traction Motors and Control Gear, L.T. Switchgear, Small Motors, Instruments, Heating and Cooking Apparatus, Light Fittings, Gas-filled Lamps, Accessories

Agents for China:

Messrs. Arnhold Bros. & Company, Limited,

SHANGHAI

Tientsin	Hankow
Peking	Changsha
Newchwang	Chungking
Mukden	Ichang
Harbin	Shansi

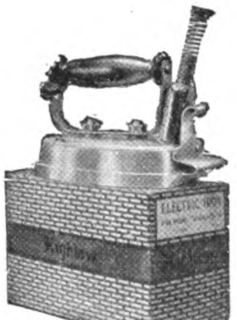
Hongkong
Canton

The Mark of Efficiency

METROPOLITAN Vickers
ELECTRICAL CO. LTD.
TRAFFORD PARK - - - - - - - MANCHESTER
ENGLAND

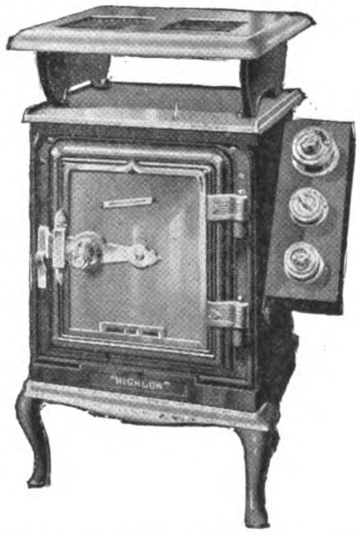
2046C

Electric Cooking "HIGHLOW" Apparatus



No. 50. IRON. Loading 500 Watts. Weight 6lbs.

Thumb rest.
Strong Tip-up Stand.
Best Nickel-plated finish.



ELECTRIC COOKER. Total Loading 4 kw.

No. 60. ELECTRIC KETTLE. 750 Watts. Polished Copper or Nickel-plated, 2 pints Capacity.

Elements are wound on clear ruby mica with nickel contacts taken direct to the terminals.

Heating and Cooking Apparatus for Domestic, Ship's and Restaurant use.

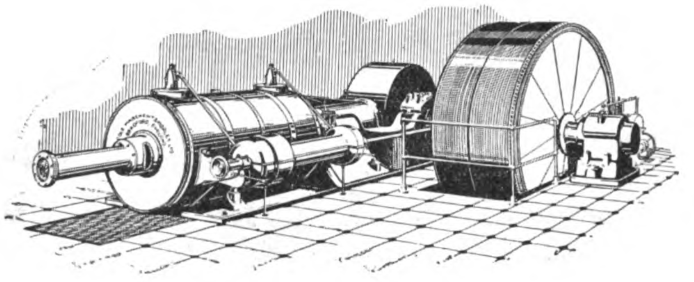
Catalogue on request to the Sole Makers:

Archibald Low & Sons, Ltd.

Merkland Works, Partick, Glasgow, Scotland

Telegrams: "Highlow, Glasgow"

Code: A.B.C.



C. M. & M. CENTRAL EXHAUST STEAM ENGINE

100 to 3,000 I.H.P.

The ideal Prime Mover for driving Mills and Plant where moderate power from 100 to 3,000 I.H.P. is required

PRINCIPAL FEATURES

ECONOMY: The steam consumption equals that of a good Triple Expansion Engine.

SIMPLICITY: This type of engine is undoubtedly the simplest economical engine of the present day.

UPKEEP COSTS: Owing to the low steam consumption, simplicity and to the fact that forced lubrication is fitted, upkeep costs and attendance are reduced to the minimum.

FLOOR SPACE OCCUPIED: Is considerably less than that required by Horizontal Compound Engines.

The above illustration is of a 1,500 I.H.P. C. M. & M. Central Exhaust Steam Engine recently shipped to Hankow, China.

Write to-day for Catalogues Nos. 63 & 69, which will be sent post free on request.

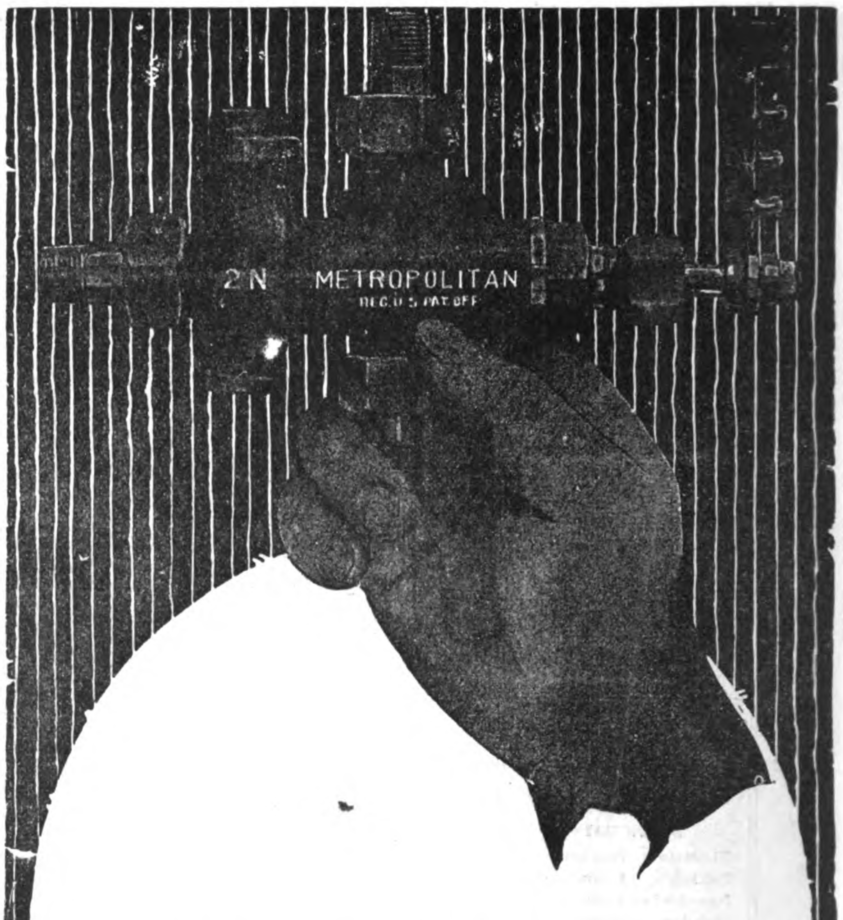
ESTA. 1848

REG. TRADE MARK

Cole, Marchent & Morley, Ltd.

Bradford, England

Cables: "Cole Bradford"



Metropolitan Injectors for Small and Portable Boilers

Metropolitan Injectors, Model N., are distinguished by their simplicity of operation. They are controlled entirely by a single handle. No valve to adjust, pack or grind. A simple turn to the left starts them—a turn to the right stops them. They operate on any steam pressure from 20 to 160 pounds without adjustment, lift water 20-ft., and automatically restart after a temporary interruption of the steam or water supply. These features make this type especially adapted to service on small and portable boilers.

Also made in a double-tube type (Model O) which is adapted for larger power plants and for service on stationary and marine boilers.

Connections made either flanged or screwed, conforming to British or Metric standards.

Our agents are prepared to advise with you and quote prices. Consult them also, regarding Ashcroft Gauges and Consolidated Safety Valves, used for years by engineers the world over.

Manning, Maxwell & Moore, Inc.

119 W. 40th St.

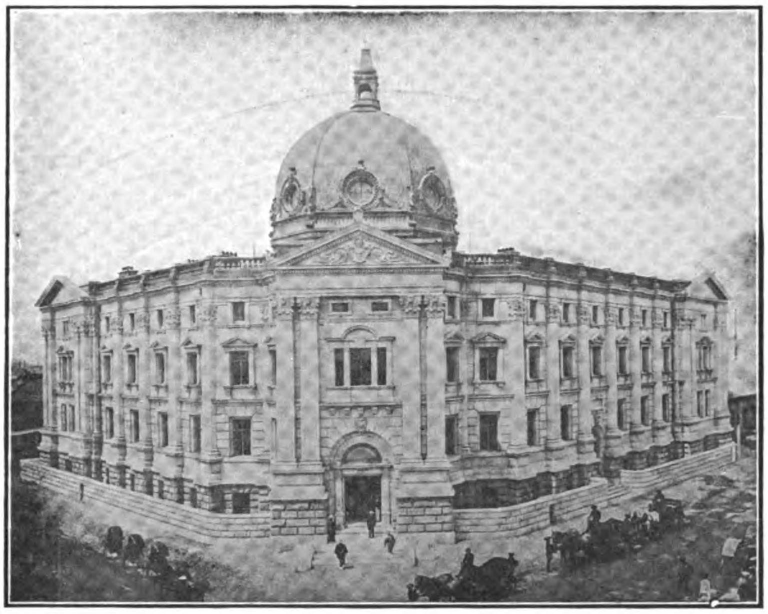
New York

Agent for China:

Henry Katten, 22 Kiukiang Road, Shanghai, China

Agent for Japan: Horne Co., Ltd., 6 Takiyama cho, Kyobashi Ku, Tokio

METROPOLITAN INJECTORS



HEAD OFFICE, YOKOHAMA

Capital (Fully Paid-Up):
Yen 100,000,000

Reserve Fund:
Yen 65,000,000

CORRESPONDENTS AT ALL THE CHIEF COMMERCIAL CITIES IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: KENJI KODAMA, Esq.
Vice-President: REITARO ICHINOMIYA, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASUNOSUKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
NAKAJI KAJIWARA, Esq.
SHIMAKICHI SUZUKI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
BARON KAISAKU MORIMURA
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.
HIROZO MORI, Esq.
KUNIZO MOGAMI, Esq.

Head Office: YOKOHAMA
Manager: N. IGARASHI, Esq.

TOKYO BRANCH
No. 1, Nichome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES.

Batavia	Dairen	Hongkong	Los Angeles (*sub-office of San Francisco Branch*)	Nagoya	Rangoon	Shanghai	Tientsin
Bombay	Fengtien	Honolulu	Lyons	Newchwang	Rio de Janeiro	Shimonoseki	Tsinan
Buenos Aires	Hamburg	Kaiyuang	Manila	New York	Saigon	Singapore	Tsingtau
Calcutta	Hankow	Kobe	Nagasaki	Osaka	San Francisco	Sourabaya	Vladivostock
Changchun	Harbin	London		Peking	Seattle	Sydney	

LONDON BANKERS

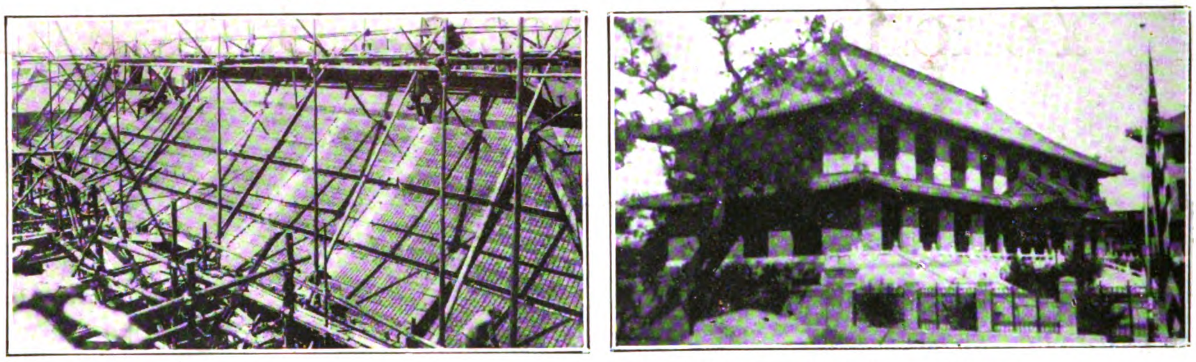
LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.

Special Distributors for Triangle Mesh in China:

ANDERSEN, MEYER & Co., Ltd., Shanghai
SHEWAN, TOMES & Co., Hongkong

TRIANGLE MESH



Triangle Mesh used in Roof Construction of the Union Medical College, Peking

FOR
GENERAL REINFORCED CONCRETE

UNITED STATES STEEL PRODUCTS CO.

SHANGHAI OFFICE: Union Building, The Bund and Canton Road
PEKING OFFICE: No. 22 Wu Liang Ta Jen Hutung
TOKYO OFFICE: No. 15 Nakadori, Marunouchi

CABLE ADDRESS:
"STEELYARD SHANGHAI"

大正七年七月十日第三種郵便物認可

AP 9990 af

THE FAR EASTERN REVIEW

FINANCE ENGINEERING COMMERCE

上海仁記路第五號

遠東時報

LINKED WITH AMERICA IN BIG INDUSTRY

Tientsin's New Power Station

SHANGHAI SANITATION

Shipbuilding Industry of Japan

Commonwealth of Australia

FAR EASTERN MOTORS

Vol. XIX | November, 1922 | No. 11

A. L. TAYLER

We make KEWANEE Regrinding Valves so sturdy that they seldom need to be reground

High-Duty Metal is the best mixture we have yet evolved to combine strength, ductility, density and hardness.

Convex Discs and Seats insure a continuous contact all the way round the seat.

FIG. W3253
GLOBE CHECK VALVE

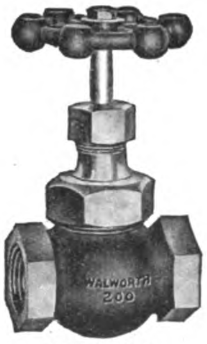


FIG. W3251
GLOBE VALVE

FIG. W3261
FLANGED GLOBE VALVE

FIG. W3252
ANGLE VALVE

They can be reground on the line without disconnecting.

Valve bodies and all assembled valves are tested with 400 lbs. Hydraulic Pressure above and below the seat.

The KEWANEE Regrinding Valve is a Quality Valve.

WALWORTH MANUFACTURING COMPANY

Oldest continuous manufacturers in the United States (since 1842) of a complete line of Valves, Fittings and Tools for steam, water, oil, gas, and air. Originators of the Famous "GENUINE WALWORTH STILLSON" Wrench and the "KEWANEE" Union.

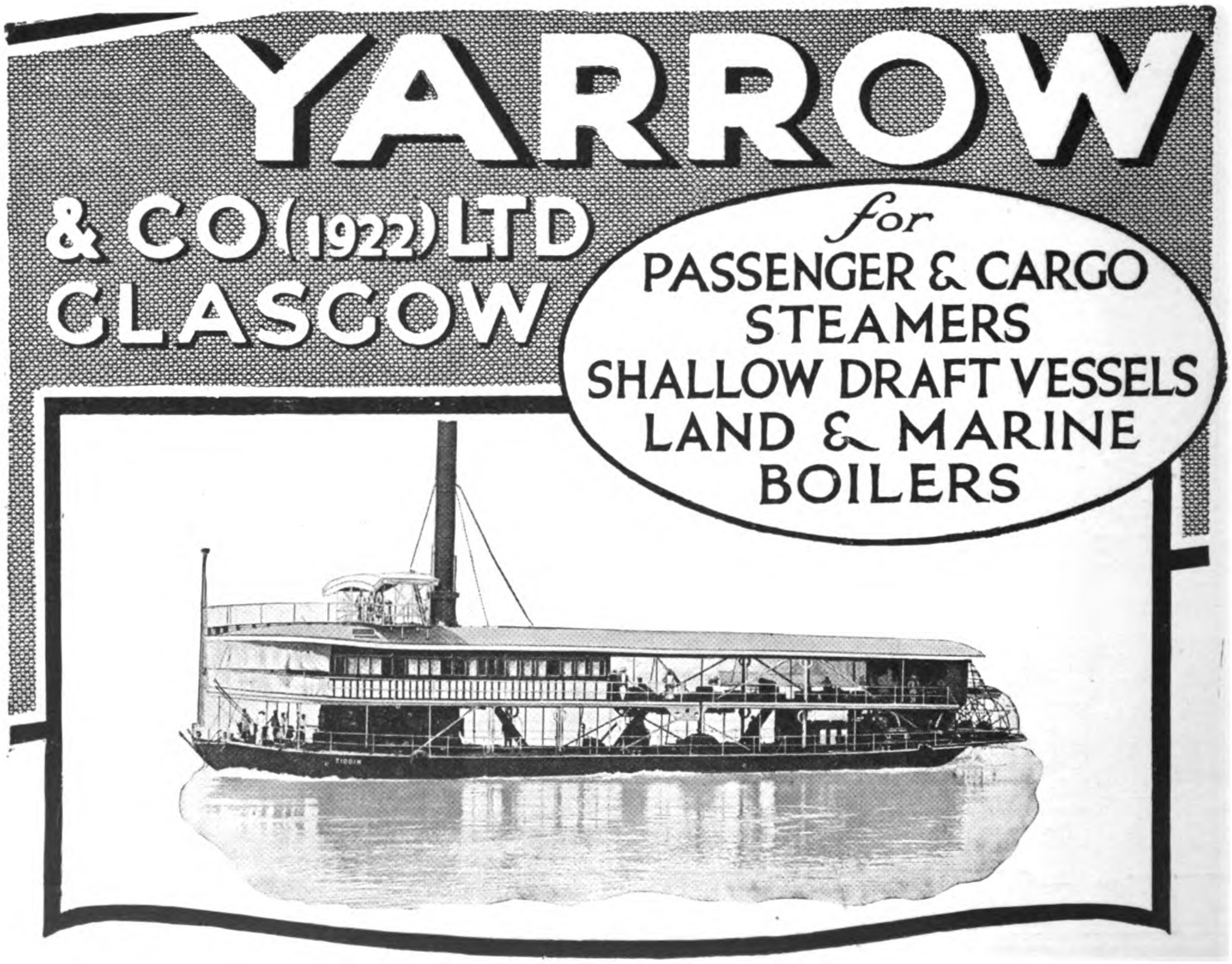
Export Sales Agents: WALWORTH INTERNATIONAL COMPANY, New York City, U. S. A.

Foreign Sales Offices in All Principal Cities

For catalog, prices or information address

HENRY KATTEN

22 Kiukiang Road, Shanghai, China



FOUNDED, 1904

The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.

HEAD OFFICE: 5 JINKEE ROAD - - - - SHANGHAI, CHINA.

George Bronson Rea, *Editor and Publisher* William Carter Rea, *Advertising Manager*

JAPAN OFFICE: H. C. Huggins, Representative, No. 12 Takagi-cho, Akasaka-ku, Tokyo.

NEW YORK: British and Colonial Press, Inc., 738 The Knickerbocker Building, Broadway and 42nd Street.

MANILA OFFICE: Fleming, Percy Smith and Seth, Roxas Building, Escolta.

BERLIN: Rudolf Mosse, 46-49 Jerusalemer Strasse.

GREAT BRITAIN: Walter Judd, Ltd., 81-87 Gresham Street Bank, London, E.C.

SAN FRANCISCO: Leroy P. Boyce, Monadnock Building

SUBSCRIPTION IN CHINA: $10.00 Mexican, U. S. & Philippines Gold $5.00, Elsewhere $12.00 Mexican per annum

VOL. XVIII NOVEMBER, 1922 NO. 11

CONTENTS:

	PAGE
LINKED WITH AMERICA IN BIG INDUSTRY	*665
DEVELOPMENT OF JAPANESE ELECTRIC LIGHT AND POWER BUSINESS, 1912-1922	*670
JAPANESE ROLLING STOCK	671
GARY NAMES NEW SECRETARY	671
GRAIN HANDLING EQUIPMENT IN JAPAN	671
BUY AMERICAN RAILWAY TIES	671
TIENTSIN'S NEW POWER STATION	*672
UP-TO-DATE SANITATION FOR SHANGHAI	*675
SHIPBUILDING INDUSTRY OF JAPAN: ITS HISTORY AND FUTURE	*681
S.M.R. Development Schemes for 1922-1923	684
JAPANESE BUILDERS ADOPT AMERICAN METHODS	*685
N.Y.K. RAPID EXPRESS SERVICE LINERS	*690
THE MACHINE TOOL TRADE OF JAPAN	691
AUTOMATIC MACHINE TOOLS IN JAPAN	*691
The Japanese and Manchurian Oil Industry	694
ASSOCIATED AMERICAN CHAMBERS OF COMMERCE IN CHINA FORMED	*695
JAPANESE ELECTRICAL NOTES	696
JAPANESE LOCOMOTIVES FOR CHINESE RAILWAYS	*698
First Jap Warship With Electric Drive Stands Sea Trial	699
Tokio Will Sell Bonds to Build New Subways	699
Chinese Develop Palm Fiber Trade with United States	699
THE COMMONWEALTH OF AUSTRALIA	*700
Chinese Make Paper from Bamboo	703
MAGNIFICENT SOCIAL CENTRE FOR TOKYO	*704
THE FAR EASTERN MOTORS:—	
Body Building in Shanghai	*707
Largest Truck in the Far East	*709
Road Building in Korea	*711
Standardized Passenger Bus Introduced by Large Lorry Manufacturer	*714
Motor Bus Services in Shanghai	715
Japan Notes	715
White Buses, Pride of Hongkong Hotels	*717
Motor Vehicles a Prime Utility in Chosen	718
Electric Freight Cars to Supplement Motor Cars in Tokyo	718
The Airship of the Future	*719
Manchurian Railway	*720

**Illustrated with Maps or Photographs*

Entered at the U.S. Postal Agency, Shanghai, China, as second-class matter. Registered at the Chinese Post Office as a Newspaper. Entered at the Japanese Post Office as a Newspaper.

ALPHABETICAL LIST OF ADVERTISERS

Admiral Line, The ... 41
Allen & Co., Ltd., Edgar ... 14
American LaFrance Fire Engine Co. Supt.
American Locomotive Sales Corp. ... 25
American Tool Works Co. ... 1
Andersen, Meyer & Co., Ltd. ... 28
Asbestos Shingle, Slate & Sheathing Co. 17
Ashton Frost & Co., Ltd. ... 19
Atlantic, Gulf & Pacific Co. of Manila 36
Attwater & Sons ... 48
Avery, Ltd., W. & T. ... 15

Babcock & Wilcox, Ltd. ... 31
Baldwin Locomotive Works ... 67
Bank of Chosen ... 54
Bank of Communications ... 59
Banque de l'Indo-Chine ... 56
Bank of Taiwan, Ltd. ... 57
Bliss Co., E. W. ... 27
Brill Co., J. G. ... 39
British-American Tobacco Company (China), Ltd. ... 52
Browning Co., The ... 65
Brunswick Kroeschell & Co. ... 73
Bucyrus Company ... 9
Butterfield & Swire ... 44

Caldbeck, Macgregor & Co., Ltd. ... 49
Canada Carbide Co. ... 15
Chartered Bank of India, Australia & China ... 48
Chicago, Milwaukee & St. Paul Railway 39
Clough, S. W. ... 4
Cole Marchent & Morley, Ltd. ... 76
Craig & Donald, Ltd. ... 31

Dai-Ichi Ginko ... 62
Dai Nippon Brewery Co. ... 74
Diamond Power Specialty Corporation 42
Dixon Crucible Co., Joseph ... Supt.
Dorman Long & Co., Ltd. ... 3
Drewry Car Co., Ltd. ... 19

Drysdale & Co., Ltd. ... 73
Electricity Department, S. M. C. ... 4
English Electric Co., Ltd. ... 13
Evans & Sons (Wolverhampton), Ld., Joseph ... 2

First National Bank of Boston ... 61
Fuji Gassed Spinning Co. ... 10

Gleniffer Motors, Ltd. ... 15
Goodell-Pratt Co. ... Supt.
Green Island Cement Co., Ltd., The .. 20
Greenfield Tap & Die Corp. ... 19
Greening & Sons, Ltd., N. ... 4

Hasler Telegraph Works ... 71
Heap & Co., Ltd., Joshua ... 53
Hongkong Rope Manufacturing Co. . 20
Hongkong & Shanghai Banking Corporation ... 63
Hongkong & Whampoa Dock Co., Ld. 30
Hotel Statler Co. ... 51
Humber, Ltd. ... Supt.

Imperial Japanese Government Railways ... 68, 69
Industrial Bank of Japan ... 58
International Banking Corporation .. 55
International General Electric Co., Inc. ... 74

Jacks & Co., William ... Supt.
Japan Sugar Mfg. Co. ... 6
Jardine, Matheson & Co., Ltd. 12 & Supt.
Jones & Lamson Machine Co. ... 53
Jugo Ginko ... 56

Kanegafuchi Spinning Co., Ltd. ... 10
Kawasaki Dockyard Co., Ltd. ... 35
Kellogg Switchboard & Supply Co. Supt.

Kelvin, Bottomley & Baird, Ltd. ... 8
Kokusai Kisen Kaisha ... 43

London Directory Co., Ltd. ... 74
Low & Sons, Ltd., Archibald ... 42

Manning, Maxwell & Moore, Inc. ... 76
Mather and Platt, Ltd. ... 7
Matthews & Yates, Ltd. ... 42
Metropolitan Vickers Electrical Co., Ltd. ... 64
McClintic-Marshall Products Co. ... 27
McConway and Torley Co. ... 21
Mitsubishi Bank ... 61
Mitsubishi Iron & Steel Co., Ltd. ... 38
Mitsubishi Marine & Fire Ins. Co., Ld. 38
Mitsubishi Shoji Kaisha ... 18
Mitsubishi Warehouse Co. ... 38
Mitsubishi Zosen Kaisha, Ltd ... 36
Mitsui Bank ... 61
Mitsui Mining Co. ... 18
Mitsui Bussan Kaisha ... 26
Motor Rail & Tram Car Co. ... 41
Mustard & Co. ... 4

New Engineering & Shipbuilding Works ... 34
Nippon Menkwa Kabushiki Kaisha .. 50
Nippon Yusen Kaisha ... 46, 47
Nobel Industries, Ltd. ... 22

Okura & Co. (Trading), Ltd. ... 24
One Hundredth Bank, Ltd., The ... 62

Pacific Steamship Co. ... 41
Pittsburgh Steel Co. ... 73
Pooley & Son, Ltd., Henry ... 2

Reay Gearworks, Ltd. ... 64
Republic Truck Sales Corp. ... Supt.
Royal Bank of Canada ... 63

Ruston & Hornsby, Ltd. ... 21
Ryerson & Son, Joseph T. ... 5

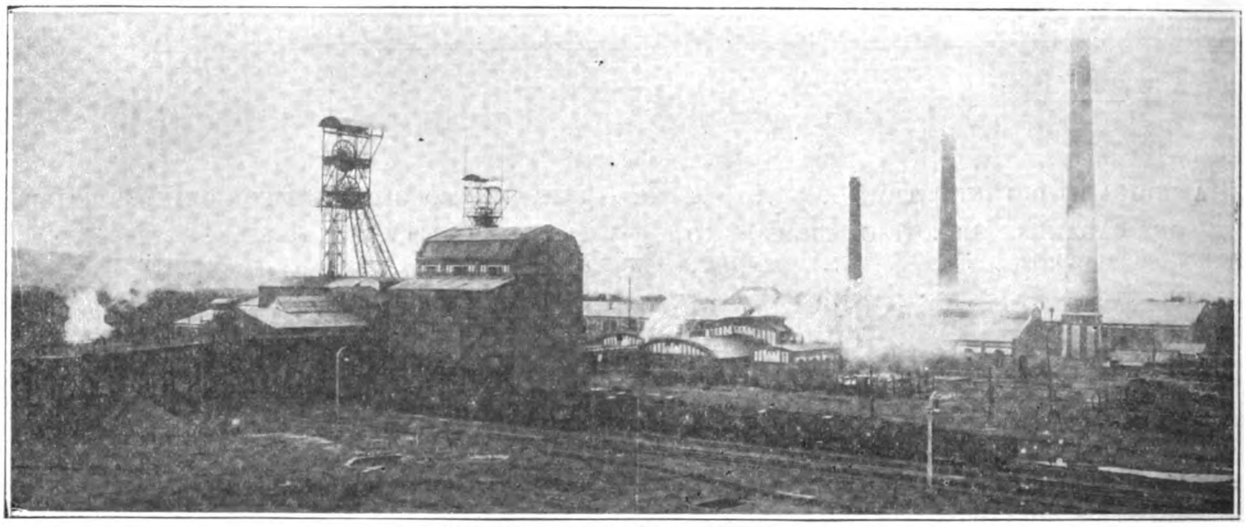
Sale & Frazar, Ltd. ... 16
Scottish Tube Co., Ltd. ... 8
Selson Engineering Co., Ltd. ... 63
Shanghai Dock & Eng. Co., Ltd ... 32
Shanghai Municipal Council ... 4
Shantung Railways ... 72
Simons & Co., Ltd., Wm. ... 14
Smith, Major & Stevens, Ltd. ... 33
South Manchuria Railway Co. 66, 70, 71
Standard Oil Co. of N. Y. .. 29 & Supt.
Stewarts & Lloyds, Ltd. ... 33
Sulzer Bros. ... 39
Sumitomo ... 60
Sumitomo Bank, Ltd. ... 60
Superheater Co., The ... 73

Thornycroft & Co., John I. ... 1
Toshin Soko ... 40
Toyo Kisen Kaisha ... 45
Transatlantische Handels-Kompagnie, m.b.h. ... 72
Trimont Manufacturing Co. ... 9

United Brassfounders & Engineers, Ltd. ... 63
United Cigarette & Machine Co. ... 41
United States Steel Products Company ... 23, 37, Back Cover

Walworth International Co. ... Cover
Werf Gusto ... 65
Wharton Jr. & Co. Inc., Wm. ... 21
Whittall & Co., Ltd., J. ... 6
Wild & Co., M. B. ... 9
Williams & Co., J. H. ... 7

Yarrow & Co., Ltd. ... Cover
Yokohama Dock Co. Ltd. ... 33
Yokohama Specie Bank, Ltd. ... Cover



The Tzuchuan Colliery, Shantung

TZUCHUAN COAL

The Cheapest and Best Coal Mined in the Far East

Annual Output: 600,000 tons.
The Coal is washed, screened, and classified for the market into five grades, viz., Lump, Slack, and Washed Coal Nos. 1, 2 and 3.
Tzuchuan Coal contains a large amount of coke, with only a small amount of ash, and has a heating capacity of 7,500 calories.
Tzuchuan Coal, which rivals the best Cardiff Coal, is highly recommended for Coke and Briquette manufacture, for Boiler and Marine use and for General Domestic use
Tokuyama Briquette Factory, Yawata Iron and Steel Works, and many other important works in Japan and China are constant purchasers.
The Wharves at Tsingtao are well accommodated as Coaling Stations for Coast and Ocean liners.

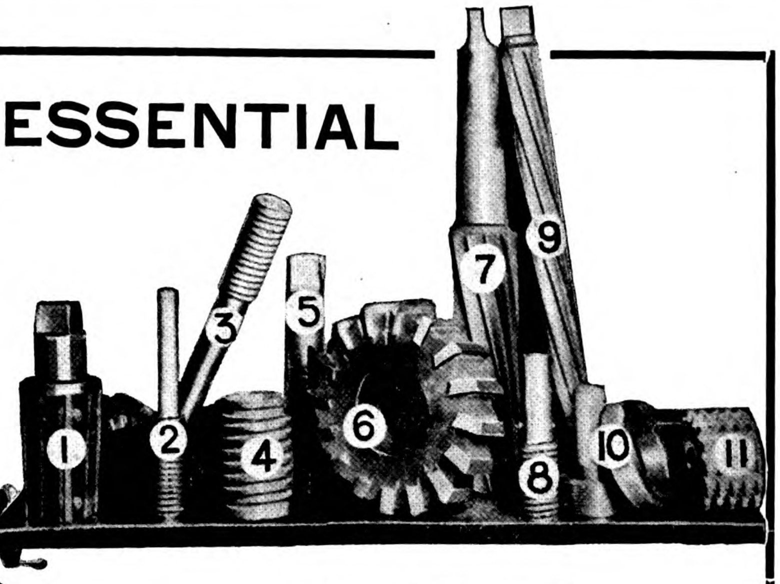
For further information please apply to the

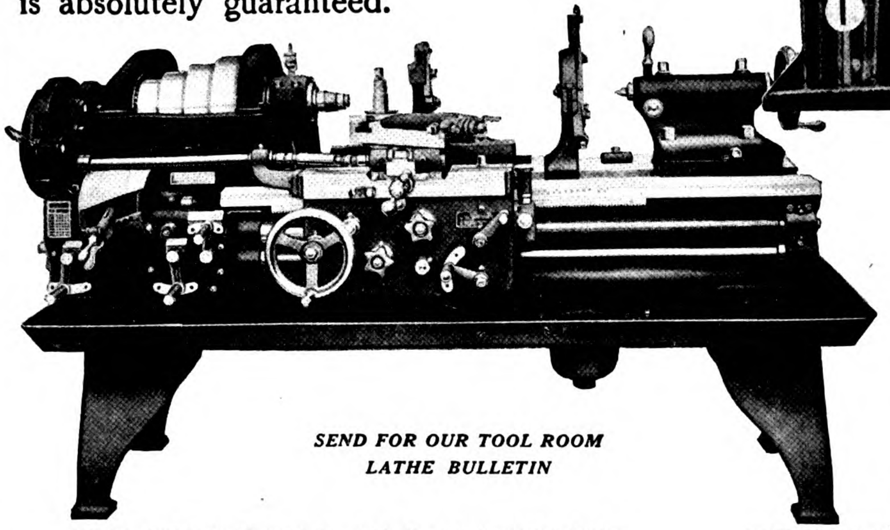
SHANTUNG RAILWAY ADMINISTRATION

Cable Address: "SANTETSU" **TSINGTAO, CHINA** **Codes: A.B.C. 5th Ed. & A.1.**

WHERE QUALITY IS ESSENTIAL

In the tool room where work of the highest quality and closest accuracy is demanded the **"American" Tool Room Lathe** has become a great favorite. In no other lathe are the qualifications for tool room service more highly developed than in the "American." The accuracy of "American" Lathes is absolutely guaranteed.





SEND FOR OUR TOOL ROOM LATHE BULLETIN

Agents: Andersen, Meyer & Co., Ltd., Shanghai and Manchuria
Horne Co., Ltd., Tokio, Japan
H. P. Gregory & Co., Sydney & Melbourne
Pacific Commercial Co., Manila, P.I.
Honolulu Iron Works, Honolulu, H.I.

AMERICAN

A UNIVERSAL TOOL ROOM LATHE

The **"American" Tool Room Lathe** will handle a wide variety of rotary cutters, taps, reamers, end mills, hollow mills, dies, etc. The "American" is completely universal and will handle as great a variety, if not greater, than any lathe built.

THE AMERICAN TOOL WORKS COMPANY

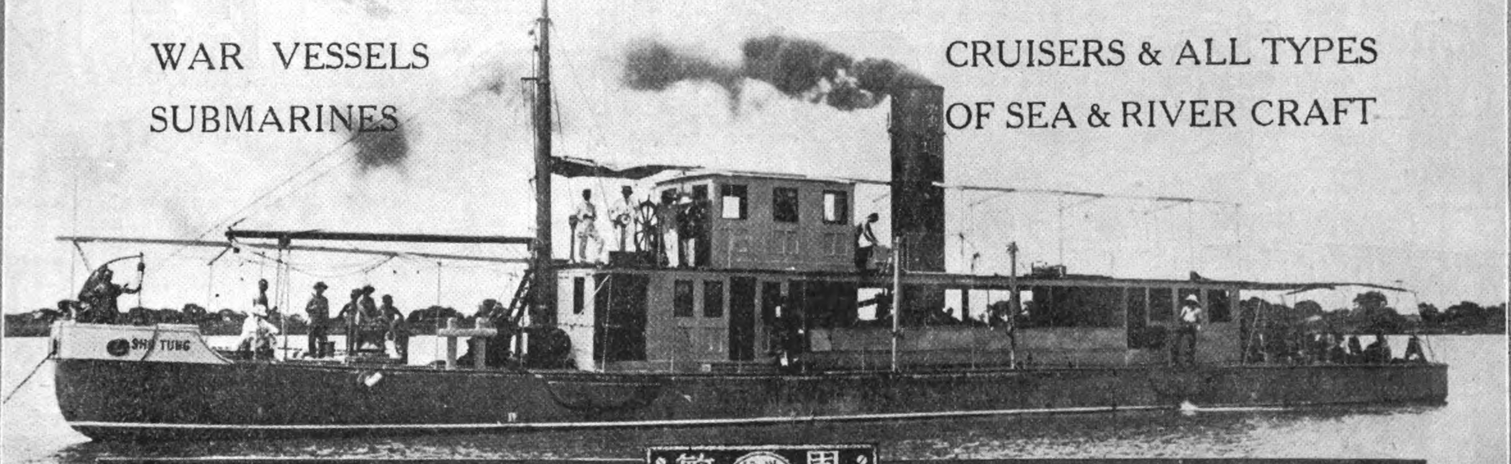
Lathes-Planers CINCINNATI, U.S.A. Shapers-Radials

THORNYCROFT

SHALLOW DRAUGHT STEAMERS

WAR VESSELS
SUBMARINES

CRUISERS & ALL TYPES
OF SEA & RIVER CRAFT



All types of River and Ocean Craft
Steam or Motor propelled. Stern Wheel or Tunnel Stern

Motor Boats to 40 knots
Water Tube Boilers
Marine Engines

Cargo Steamers to 5,000 tons.
Steam Turbines
Oil Fuel Gear

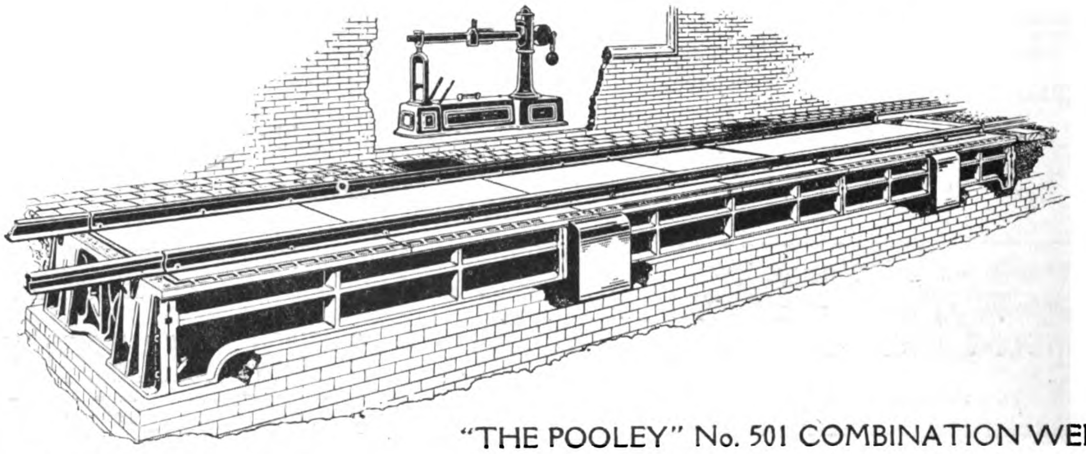
Marine Motors for Petrol or Paraffin
Stationary Oil Engines for Electric Lighting, Pumping and Power Plants

JOHN I. THORNYCROFT & CO., LTD.

10 Kiukiang Road : : Shanghai
London, S.W. 1, England. Works: Southampton

POOLEY

WEIGHING MACHINE & WEIGHBRIDGE MAKERS



"THE POOLEY" No. 501 COMBINATION WEIGHBRIDGE, CAPACITY 70 TONS, SPECIALLY DESIGNED FOR CHINA.

HENRY POOLEY & SON LTD
JOHN BRIGHT ST
BIRMINGHAM
ENGLAND

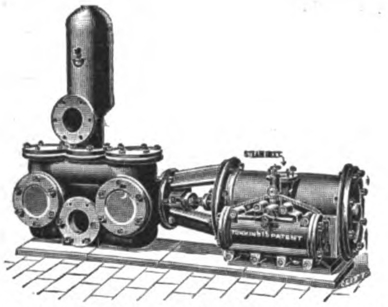
P.A. 123.

WE MANUFACTURE

PUMPS

FOR EVERY PURPOSE

To be worked by HAND, STEAM, BELT, WIND, WATER or ELECTRIC POWER.



STEAM PUMP for General Purposes

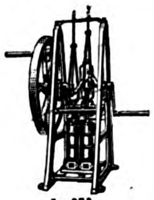
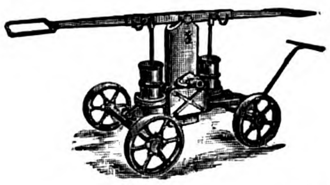
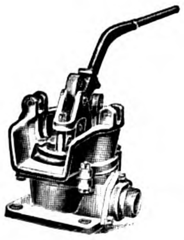
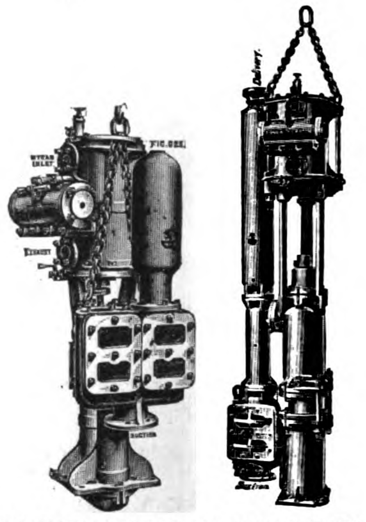


Fig.223.

Fig.160.







SINKING PUMPS for COLLIERIES, MINES, Etc.

Fig.121.

Fig.185.

Write for "Eastern" List.

JOSEPH EVANS & SONS

(WOLVERHAMPTON) LTD

CULWELL WORKS,

WOLVERHAMPTON, ENGLAND.

Agents for China

J. WHITTALL & CO., LTD.

16 Victoria Terrace
Tientsin

12 Nanking Road
Shanghai

33 Ta Juan Fu Hutung
Peking

Stocks Kept in Tientsin and Shanghai.

DORMAN, LONG & Co., Ltd.

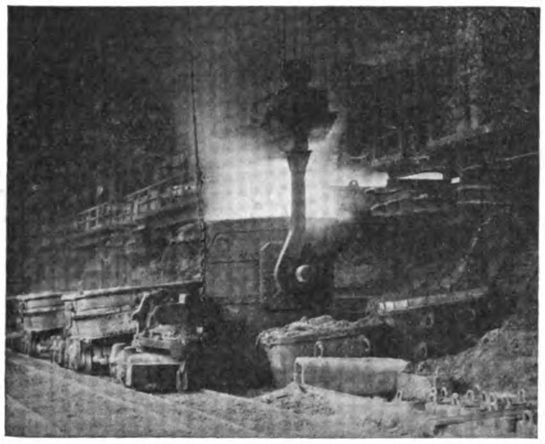
Steel Manufacturers,

Bridge Builders & Constructional Engineers,

MIDDLESBROUGH, ENGLAND.

Telegraphic Address:
"DORMAN-MIDDLESBROUGH."

Codes —
BENTLEY'S; A.B.C. (5th and 6th Editions)
and WESTERN UNION (Universal & 5 Letter).

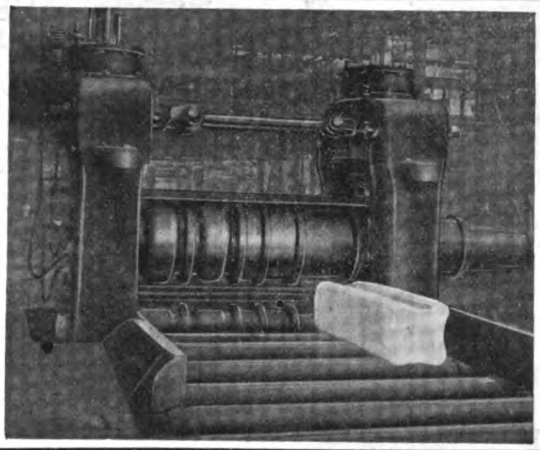


Britannia Steelworks,
MIDDLESBROUGH.

Open-Hearth
STEEL JOISTS,
ANGLES and
OTHER SECTIONS,
RAILS.

Open-Hearth STEEL BARS in long lengths suitable for

FERRO-CONCRETE WORK,
BILLETS AND BLOOMS.



Redcar Iron and Steel Works, Redcar.

Steel Works and Rolling Mill Dept.

Plate Mills capable of Rolling all Plates for **Shipbuilding and Engineering** purposes, from $\frac{3}{16}''$ to $1\frac{1}{2}''$ thick, fulfilling the requirements of British Standard Tests, Board of Trade, Admiralty, Lloyds, etc.

Universal Plates with Rolled Edges 12″ to 42″ wide up to 90-ft. long.

Clarence Steel Works and Rolling Mills,
PORT CLARENCE.

High-class Steel in quality from Dead Soft to 1.25 per cent. Carbon for the manufacture of Wire, Springs, Files, Saws, Forgings, Stampings, Rifle Barrels, Agricultural Implements, etc. Conductivity Steel to stand General Post Office, India Office and British Railway Tests.
Electrically Melted Steels of all Carbons.

NICKEL ALLOY STEEL.

Flange and Bulb Head Rails, Billets, Slabs, etc.

Ayrton Rolling Mills,
MIDDLESBROUGH.

Galvanized Corrugated and Plain Sheets,

Ridging, Gutters, Downpipes, Fountain Heads, etc.

Ordinary Galvanized Fittings kept in Stock.

Cleveland Wire Mills,
MIDDLESBROUGH.

Wire Rods and all kinds of Wire for all purposes. Telegraph & Telephone Wire. Annealed Core Wire. Galvanized Seizing Wire. Galvanized Rigging Wire. Galvanized & Varnished Fencing Wire. Galvanized Strand & Barb Wire. Galvanized Cable Wire.

Galvanized Patent Steel Hawser Wire to Lloyd's Tests.

Bright Patent and Plough Steel Rope Wire.

The Mills can supply the **longest single length** of Rods or Wire without weld or joint of anyone in the Trade.

Constructional Department,
MIDDLESBROUGH.

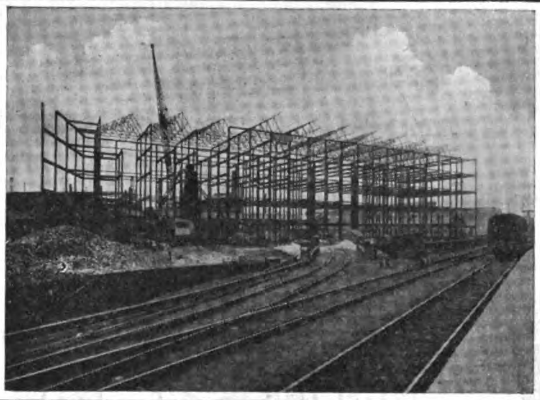
STRUCTURAL STEELWORK

for all purposes.

Speciality :

STEEL FRAME BUILDINGS

for home and abroad.



AGENTS:—

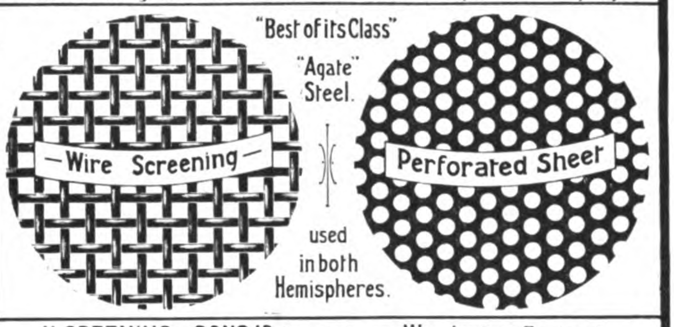
REPRESENTATION for BRITISH MANUFACTURERS, LTD.

CHING MING BUILDINGS,
BRITISH CONCESSION,
HANKOW.

43 KIANGSE ROAD,
SHANGHAI.

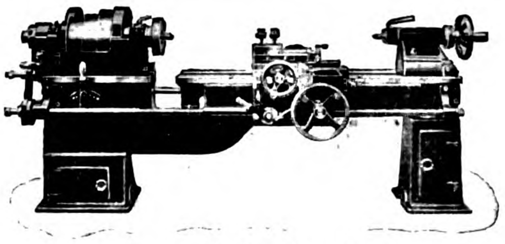
REGINES BUILDINGS,
LEGATION STREET,
PEKING.

Wire Screening and Perforated Sheets in all meshes, metals and gauges.



"Best of its Class" "Agate" Steel. used in both Hemispheres.

N. GREENING & SONS, L^D., Manufacturers, Warrington, England.



HEAVY DUTY LATHES

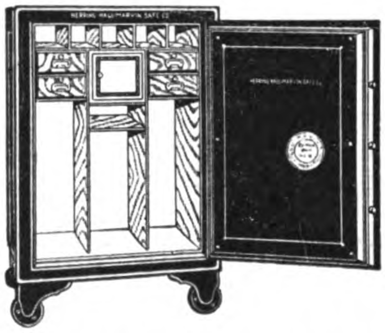
7-in. and 9-in. Centres

HIGH-CLASS MACHINES AT MODERATE PRICES

S. W. CLOUGH

REDBURN LATHE WORKS

SHIPLEY, Eng.



Unfailing Protection For Your Most Valued Possessions

HERRING-HALL-MARVIN

Safes and Bank Vaults

All sizes from the smallest Home Safe to the largest Bank Vaults, Key-Lock or Combination.

MUSTARD & COMPANY

Sole Agents for China, Hongkong and Macao.

Shanghai, Tientsin, Hankow, Hongkong, Canton, Harbin.

THE

MUNICIPAL ELECTRICITY DEPARTMENT

HAS RECEIVED DEMANDS FOR

ELECTRIC POWER

AMOUNTING TO

80,000 HORSE POWER

AND PLANS TO INCREASE ITS GENERATING PLANT TO A CAPACITY OF

180,000 HORSE POWER

DO YOU THINK

IT IS POSSIBLE TO MAKE YOUR OWN POWER AT A COST WHICH CAN COMPETE

? WITH THE CHEAP RATES MADE AVAILABLE ?

BY THE OPERATION OF THIS VAST MODERN POWER PLANT?

ASK

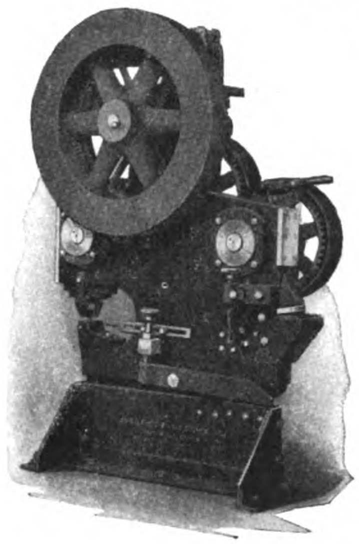
THE POWER DEPARTMENT, FOOCHOW ROAD, SHANGHAI

TELEPHONE FOR AN APPOINTMENT TO CENTRAL 283.

RYERSON

Quadruple Combination Punching and Shearing Machine

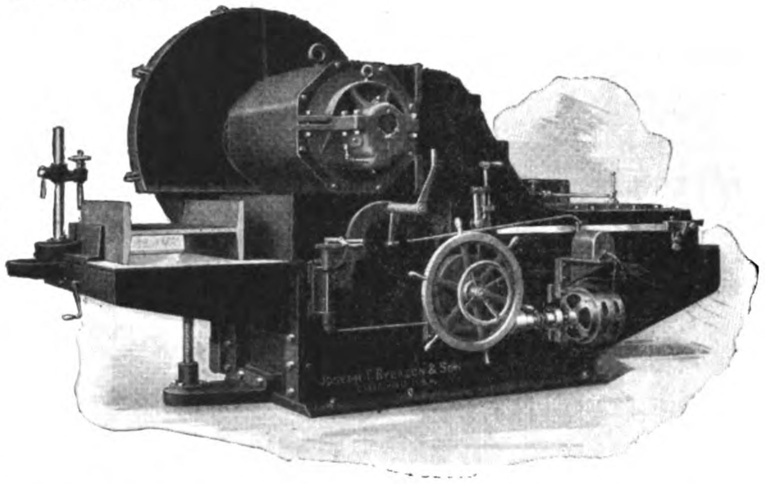
U. S. and Foreign Patents



The Ryerson Quadruple Combination Punching and Shearing Machine embodies four single tools in one, handling punching, shearing of plates, round and square bars, cutting of angle and tee iron, as well as coping and notching work. All of this can be done without interchanging the attachments for the various operations or having to maintain a number of single machines for each operation. This machine is furnished arranged for either belt drive or direct motor drive. We also manufacture this type of punch and shear in single units, or in different combinations to meet special conditions.

Ryerson Universal High Speed Friction Saw

U. S. and Foreign Patents



The Ryerson High Speed Friction Saw is designed for rapid cutting of steel shapes of all descriptions. The use of the High Speed Friction Saw in railroad shops and frog and switch shops is a recognized necessity for the efficient and rapid cutting of rails, beams, angles, channels, tees, zees, round bars, etc., as well as the various special sections which are being employed in steel construction. This saw will cut different shapes in rapid succession without the necessity of interchanging any attachments or clamping the material. A 24″ I-beam can be cut in 50 seconds. This saw is made in various sizes, from No. 1 to No. 5, with capacity to cut from the smallest to the largest sections rolled.

Write for complete descriptive bulletin. A bulletin on any particular machine, or a complete catalogue on all Ryerson Machines, will be mailed at your request.

JOSEPH T. RYERSON & SON

ESTABLISHED 1842

NEW YORK
BUFFALO

CHICAGO, ILL., U. S. A.

ST. LOUIS
DETROIT

Cable Address: Ryson, Chicago. Telegraphic Codes: Western Union, Lieber's, A. B. C. (5th Edition), Bentley's, Ryerson.

12

TRADE MARK S

CABLE ADDRESS: "SUGAR," TOKYO
CODE: A.B.C. 5TH EDITION
Head Office:
No. 12 Sanchome, Kakigara-Cho,
Nihonbashi-Ku, TOKYO

RAW SUGAR REFINED

THE JAPAN SUGAR CO., LTD.
(DAI NIPPON SEITO KABUSHIKI KAISHA)
CAPITAL: YEN 18,000,000; PAID-UP: YEN 12,000,000

TRADE MARK S

J. WHITTALL & CO., LTD.

TIENTSIN — ENGINEERS AND MERCHANTS SPECIALISTS IN — PEKING

MINING, RAILWAY AND TEXTILE MACHINERY

Agents in North China for:

HADFIELDS, LTD.
Mining and Light Railway Material of all Kinds

BELLIS & MORCOM, LTD.
Engines, Turbines, Condensers and Air Compressors

CROMPTON & COMPANY, LTD.
Electrical Generators and Motors

JOHNSON & PHILLIPS, LTD.
Electrical Cables and Transformers

M. B. WILD & COMPANY, LTD.
Winding and Hauling Machinery

HOWARD & BULLOUGH, LTD.
Textile Machinery and Cotton Mill Accessories

WARRINGTON WIRE ROPE WORKS, LTD.
Steel Wire Ropes

JOSEPH EVANS & SONS, LTD.
Mining Pumps

LEWIS BERGER & SONS, LTD.
Paints

Codes : Engineering 2nd Ed. A.B.C., 5th Ed. Bentley's: Kendall's: Scholfields: Private

Telegrams: "Whittal."

WILLIAMS'
SUPERIOR
Drop-forged
Wrenches

W

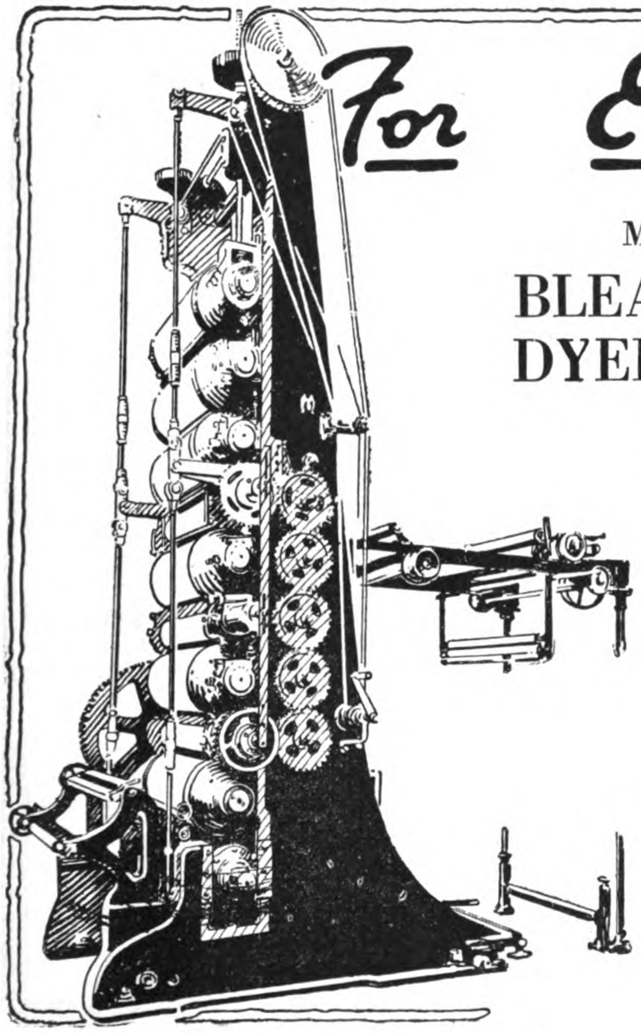
Over 40
Standard patterns
in 1000 Sizes

J. H. WILLIAMS & CO.,
"The Wrench People"

EXPORT OFFICE:
124, State Street.
New York, U.S.A.

LONDON REPRESENTATIVE:
Benj. Whittaker, Ltd.,
Dept. K.
56, Ludgate Hill, E.C. 4.

GENERAL OFFICES:
124, Richards Street,
Brooklyn, N.Y. U.S.A.



For Eastern Requirements

MODERN MACHINERY FOR

BLEACHING, PRINTING, DYEING and FINISHING

SOME SPECIALITIES:

Shearing and Moting Machines.
Mather Kiers Mercerising Ranges.
High-Speed Stentering Ranges.
Spray Damping Machines.
Calenders of all kinds and for all purposes.
Cotton and Paper Bowls Finishing Ranges.
High-Speed Beetling Machines.
Duplex and Intermittent Printing Machines.
Complete Plants for treating all classes of Cotton and Silk Goods.
Electrolitic Plants for the production of Sodium Hypochlorite for Bleaching and other purposes.

MATHER & PLATT, LTD.

Engineers
Park Works, Manchester,
England
and
14 Great Smith Street,
London, S.W., England
47 Szechuen Road, Shanghai

TUBES

IRON, STEEL, BLACK, GALVANISED

BOILER TUBES

Gas Water and Steam Tubes and Fittings
Boring & Casing Tubes
Tubular Coils for Heating and other Purposes.

STC

Sole Licensees in Great Britain for the Manufacture of

"ARMCO" Rust and Corrosion Resisting Iron Tubes

Write for Descriptive Pamphlet

THE SCOTTISH TUBE CO., LTD.

Head Office: 34 Robertson Street, GLASGOW.

Branch Offices—London, Manchester, Leeds, Liverpool, Newcastle-on-Tyne, Cardiff, Sydney, N.S.W.; Wellington, N.Z., Johannesburg, Cape Town and Durban, S.A.

Works—Glasgow, Govan, Coatbridge, Rutherglen and Garnkirk.

Telegraphic Address: "Scotubeco" Glasgow. Codes: A1, A.B.C. (4th & 5th Editions), Lieber's, Bentley's, Western Union and Private.

The Pneumercator Tank-Gauge

(PATENTED)

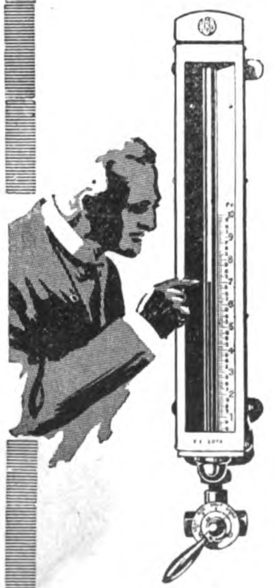
Measures and Weighs

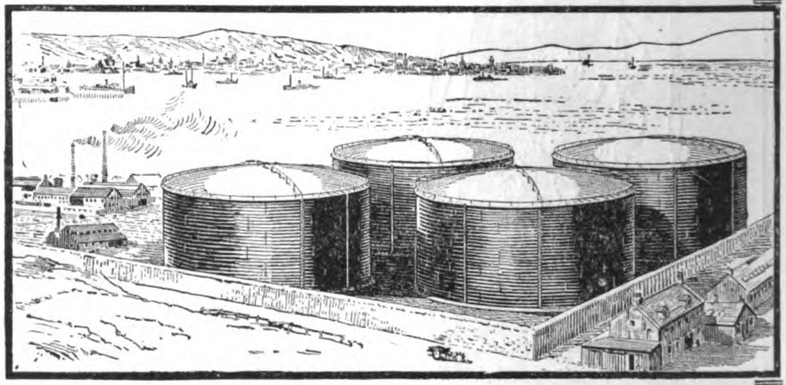
FUEL OIL

or Any Liquid,
in Any Tank,
at Any Distance

Unaffected by Changes of Temperature.

NO FIRE RISKS.





WRITE FOR DESCRIPTIVE BOOKLET.

Sole Manufacturers for GREAT BRITAIN and EUROPE, INDIA, CHINA, AUSTRALIA, NEW ZEALAND, SOUTH AFRICA, ARGENTINE REPUBLIC, CHILE

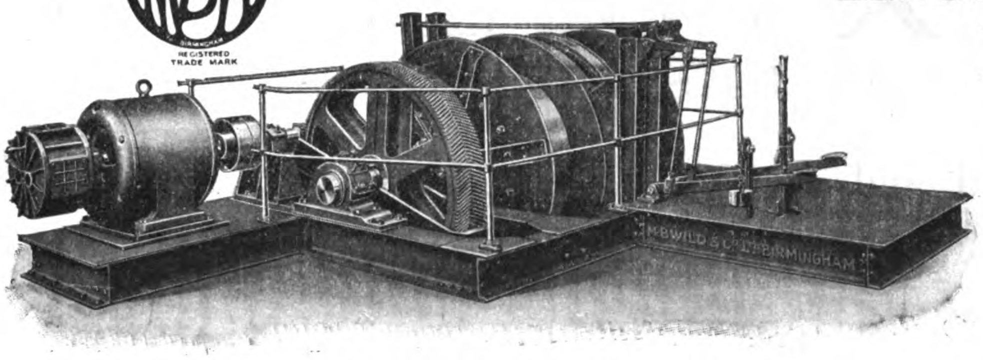
KELVIN BOTTOMLEY & BAIRD LTD

MANUFACTURERS OF THE LATE LORD KELVIN'S INVENTIONS AND OTHER INSTRUMENTS

18 CAMBRIDGE ST. GLASGOW

YOUR HAULAGE REQUIREMENTS

REGISTERED TRADE MARK



Will be best met by a firm with a long experience with this class of Machinery. This, in combination with fully equipped and specially adapted works, enables us to offer machines most suited to your needs.

Write for our illustrated Catalogue and Lists.

M. B. WILD & CO., LTD., BIRMINGHAM., ENGLAND

Telegrams: "Hauling," Birmingham. *Codes:* A B C (5th Ed.) Lieber's, Bentley's.

AGENTS:

J. WHITTALL & CO., LTD.

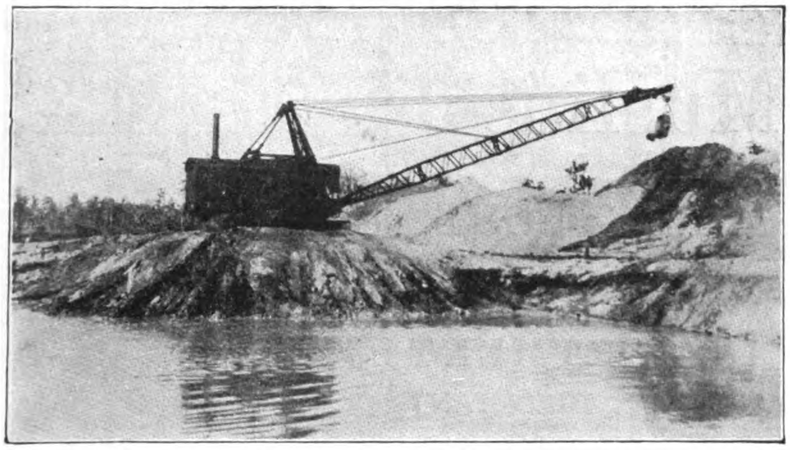
SHANGHAI TIENTSIN PEKING

TEL. ADD.: "WHITTALL" TIENTSIN 14, 16 & 18 VICTORIA TERRACE, TIENTSIN	TEL. ADD.: "WHITSHANG" SHANGHAI KELLY & WALSH BLDG., SHANGHAI	TEL. ADD.: "WHITTALL" PEKING 32 TA JUAN FU HUTUNG, PEKING

BUCYRUS

TRADE-MARK Registered

DRAG-LINE EXCAVATING MACHINERY



This dragline is digging at a spot 300 feet distant from the dumping pile

If you are interested in irrigation or drainage work, it will pay you to investigate Bucyrus dragline excavators.

40 years of experience in building excavating machinery are incorporated in our steam and electric shovels, dragline excavators, dipper, hydraulic and placer dredges.

BUCYRUS COMPANY

South Milwaukee, Wisconsin, U.S.A.

Cable Address: "BUCYRUS, SOUTH MILWAUKEE"

London Office: BUCYRUS COMPANY, 19, Iddesleigh House, Caxton Street, Westminster.

Agents in Siam:	*Agents in India:*	*Agents in Malay States:*
D. Couper-Johnston & Co., Bangkok, Siam.	McLeod & Co., Calcutta and Bombay India.	The Borneo Company, Ltd., Singapore, S.S.

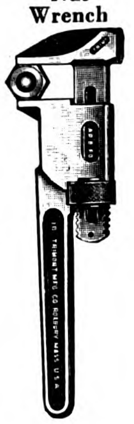
TRIMO WRENCHES

Pipe Wrench

Supplied with steel frames that do not break, nut guards that keep the adjusting nut from being turned accidently in close quarters, and inserted jaws in end of handle that can be removed when worn, saving the handle.

There are other superior points that every user of Trimo Pipe Wrenches knows—all for economy to the user.

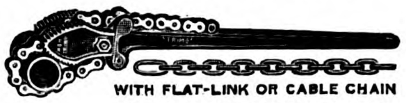
Nut Wrench



Trimo Pipe Cutter

As a 1 or 3 Wheel Cutter

Trimo Chain Wrench



WITH FLAT-LINK OR CABLE CHAIN

TRIMONT MFG. CO.,

Roxbury (Boston), Mass.

JAPANESE

TEXTILES

FOR EXPORT

Standard Printed and Dyed Cotton and Silk Fabrics

SHIRTINGS SHEETINGS DRILLS
PRINTS CRETONNES FLANNELETTES
DAMASKS TOWELING CREPES
ETC. ETC.

PONGEES BROCADES SATINS
CREPES SILKS

FUJI GASSED SPINNING COMPANY, LIMITED

(FUJI GASU BOSEKI KABUSHIKI KAISHA)

Head Office:
GOCHOME, OSHIMA-MACHI
NEAR TOKYO
CABLE ADDRESS: "FUHO"

CAPITAL - Yen 38,000,000
OPERATING
450,000 Spindles and
1,775 Looms

Business Office:
SHICHOME, HAKOZAKI-CHO,
NIHONBASHI-KU,
TOKYO

Silks, Crepes, Brocades, Cotton Cloths, Muslins

SILK AND COTTON YARNS, NOILS, etc.

OUR EXPORT DEPARTMENT
IS REPRESENTED IN ALL THE IMPORTANT COMMERCIAL CENTERS OF THE WORLD AND CAN FURNISH PROMPTLY FULL INFORMATION AND QUOTATIONS REGARDING THE LARGE VARIETY OF TEXTILES MADE IN OUR MILLS

KANEGAFUCHI SPINNING COMPANY, LIMITED

HIGASHI-SHIRIIKE, KOBE, JAPAN

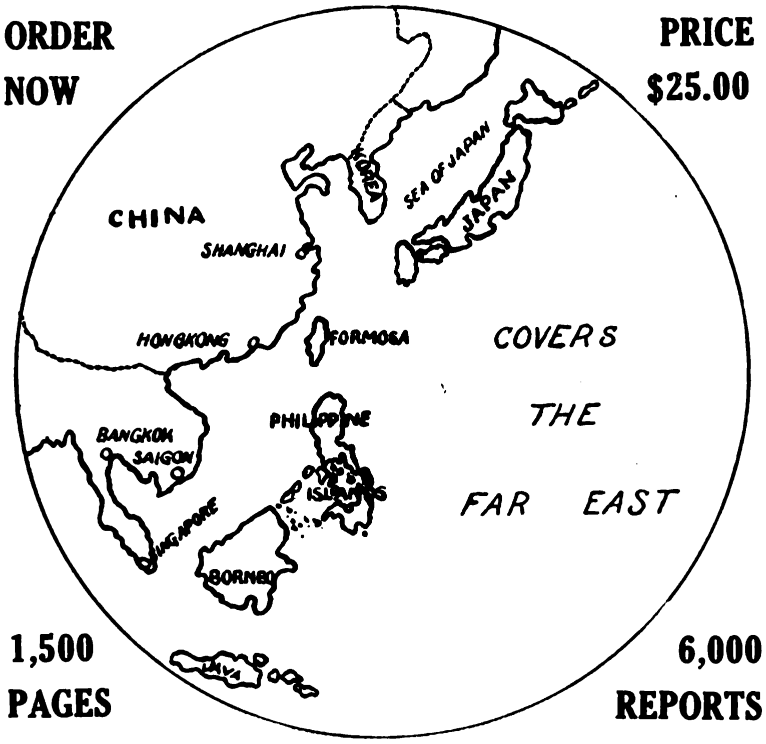
THE FAR EASTERN MANUAL

of

FINANCE and INDUSTRY

ORDER NOW

PRICE $25.00



1,500 PAGES

6,000 REPORTS

Sample Pages on Request

PUBLISHED BY

THE FAR EASTERN REVIEW

SHANGHAI - CHINA

Jardine, Matheson & Co., Ltd.

CANTON | HANKOW | ICHANG | TIENTSIN
CHENGTU | HARBIN | PEKING | TSINGTAO
CHUNGKING | HONGKONG | SHANGHAI | ETC.

Engineering Show Room: 8A YUEN-MING-YUEN ROAD, SHANGHAI

Sole Agents for Associated British Machine Tool Makers, Limited.

Comprising the following Firms :—

JAMES ARCHDALE & CO., LTD, Birmingham.
WILLIAM ASQUITH, LTD., Halifax.
J. BUTLER & CO., Halifax.
THE CHURCHILL MACHINE CO., LTD., Manchester.
DEAN, SMITH & GRACE (1908), LTD., Keighley.
KENDALL & GENT, LTD., Manchester.
JOHN LANG & SONS, LTD., Johnstone, Glasgow.
J. PARKINSON & SON, Shipley.
GEO. RICHARDS & CO., LTD., Broadheath, Manchester.
THOMAS SHANKS & CO., Johnstone, Glasgow.
SMITH & COVENTRY, LTD., Manchester.
H. W. WARD & CO., LTD., Birmingham.

The full range of Machine Tools manufactured by this combination is as follows:

LATHES

Sliding Surfacing and Screwcutting Lathes, Plain Lathes, High Speed Lathes, Axle Lathes, Toolroom Lathes, Surfacing and Boring Lathes, Vertical Boring Lathes, Cutting-off Lathes, Heavy Forge Lathes, Gun Lathes, Shafting Lathes, Break Lathes, Wheel Lathes, Relieving Lathes, Capstan, Turret and Brassfinishers Lathes of all types. Chucks and Self-opening Dieheads.

DRILLING MACHINES

Radial Vertical Drills of all sizes. Girder, Portable and Multiple-spindle Radials, Pipe-flange Drilling and Facing Machines, Ball-bearing Sensitive Multiple Drills and High-speed Drilling Machines.

MILLING MACHINES

Plain, Vertical, Horizontal and Universal Milling Machines, Plano-Milling Machines, Keyway and Slot Drilling Machines, Thread Milling Machines.

PLANING AND SHAPING MACHINES

Planing Machines in all sizes, Armour-plate Planing Machines, Pillar and Traversing Head Type Shaping Machines, Spiral Bevel Gear Planers, Side Planing Machines, etc.

BORING MACHINES

Horizontal Boring Machines, Special Boring Mills for Turbine Casings, Tyre Boring Machines.

GRINDING MACHINES

Twist Drill Grinding Machines, Cylindrical Grinders, Crank Shaft Grinders, Cam Grinders, Universal Chucking Grinders, Internal Grinders, Piston Ring Grinders, Wet Tool Grinders, Cutter Grinders, etc.

SLOTTING MACHINES

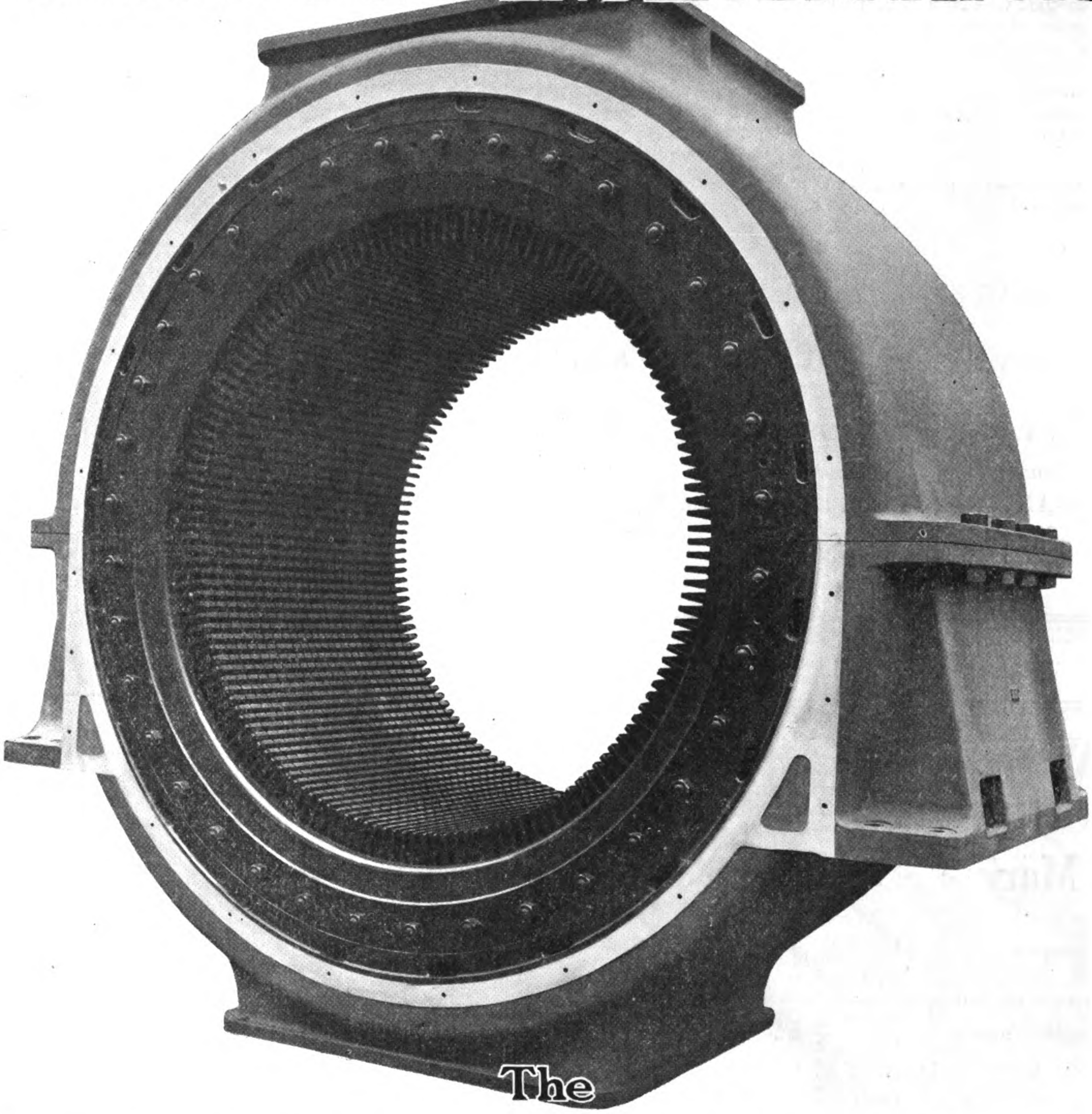
All types including High Speed and Portable Slotting Machines.

MISCELLANEOUS

Cutting-off Machines, Bolt Screwing Machines, Gun-boring, Lapping and Rifling Machines, Centring and Facing Machines, Nut Facing Machines, Universal Sharpening Machines, Mandrel Presses, Sand Blasts, Air Compressors, Broaching Machines, Twist Drills and Vices of all kinds.

ENQUIRIES SOLICITED

10,000 H.P.
WATER DRIVEN ALTERNATOR



The

ENGLISH ELECTRIC
Company Limited.

WORKS:-

DICK, KERR WORKS, PRESTON.
ORDNANCE WORKS, COVENTRY.
PHŒNIX WORKS, BRADFORD.
SIEMENS WORKS, STAFFORD.
WILLANS WORKS, RUGBY.

HEAD OFFICE:-

Queen's House, Kingsway, London, W.C. 2.

TELEPHONE — — — — — — — — — — — — HOLBORN, 830.

China Office: JARDINE, MATHESON & CO., LTD., Engineering Dept., 8a Yuen-Ming-Yuen Road, Shanghai

Japan Office: ENGLISH ELECTRIC CO., LTD., 3 Itchome, Uchisaiwaicho, Kojimachi-Ku, Tokyo

Progress Outstrips a Trade Mark

The important step of changing the name of one of their products has recently been taken by Edgar Allen & Co., Ltd. in connection with their "Air-hardening" high speed steel. In the early days the term "Airhardening" was applied to one type of tool steel only, containing tungsten, also known as self-hardening steel. When high speed steel was introduced, "Airhardening" was adopted as the trademark for a new Edgar Allen Steel of this type. Eventually, however, the word "airhardening" broadened until it became a generic term for high speed steels, and even, of late years, for certain alloy steels used in the construction of motor cars. Its force as a distinctive private brand for a particular steel was lost. Engineers overseas frequently indented for airhardening steel, meaning Edgar Allen's high speed steel of that name, but as the inverted commas were omitted, buyers in England took the term as a mere general technicality applicable to all high speed steels, and ordered from firms other than Edgar Allen & Co., Ltd.

The only way to prevent this was to change the name. This has been done, and the Edgar Allen "Airhardening" high speed steel now becomes "Stag Airhardening," thus linking it up with the two other famous "Stag" qualities. For convenience the three qualities are here enumerated :

Name	*Brand*	*Purpose*
STAG EXTRA-SPECIAL	Extra-Special	For extra-heavy work
STAG SPECIAL	Special	For heavy work
STAG AIR-HARDENING	AIR-HARDENING	For the general run of work

Branch Office in Japan:
EDGAR ALLEN & CO., LTD.,
2 Mitsu Bishi Buildings,
1 Yaesu Cho, Kojimachi-Ku,
Tokyo

Edgar Allen & Co. Ltd
Imperial Steel Works
Sheffield

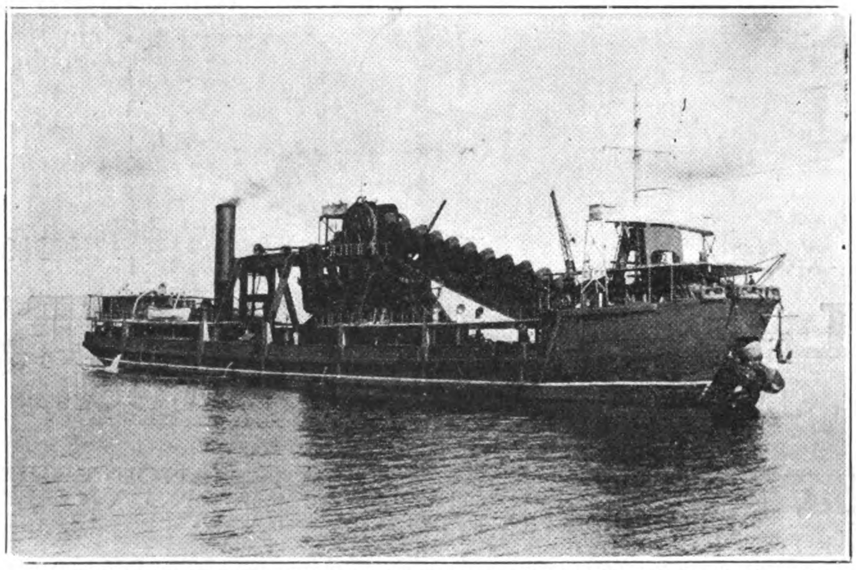
Agents in China:
Jardine, Matheson & Co., Ltd.,
8a Yuen-Ming-Yuen Road, S'hai
and at Hongkong, Tientsin,
Hankow, Peking, etc.

Wm. Simons & Co., Ltd., Renfrew

CONSTRUCTORS OF

Marine Dredging Plant
of most Modern and Improved Types and of the Greatest Capacities.

Constructors of Barge Loading, "Simons" Reclamation, Canal and Suction Cutter Hopper Dredgers. Hopper and Barge Loading Bucket Dredgers. Alluvial Dredgers. Trailing Suction Dredgers.



Twin Screw Bucket Ladder Hopper Dredger *Silurus*, Constructed to the Order of the Bombay Port Trust

Propelling and Dumb Hopper Barges.

Replace Parts supplied or fitted to existing Dredgers.

Inventors and First Constructors of "Hopper" and "Sternwell" Dredgers and Elevating Deck Ferry Steamers.

Head Office and Works: Renfrew, near Glasgow.

Telegrams: "Simons" Renfrew.

Established 1810

AVERY

PROPELLER BALANCER

No. 540

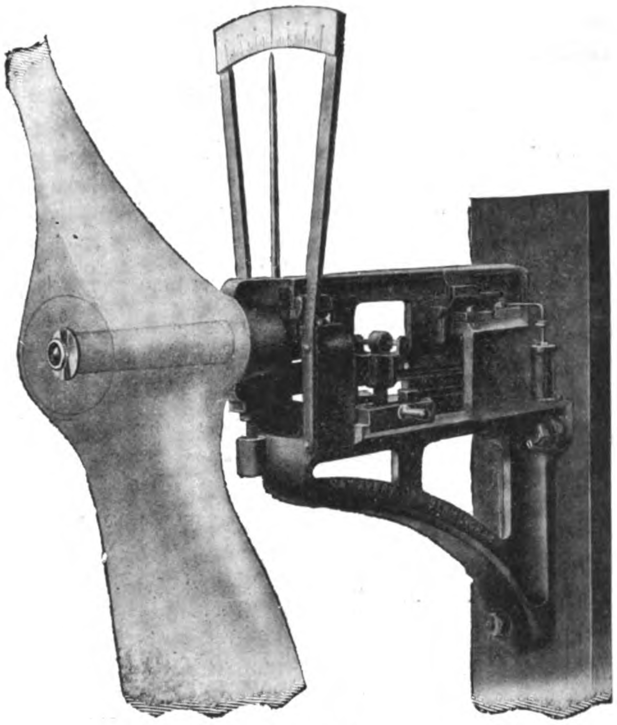
OWING TO THE HIGH SPEED OF ROTATION TO WHICH PROPELLERS ARE SUBJECTED, THE BLADES MUST BE ACCURATELY BALANCED. ANY SLIGHT EXCESS OF WEIGHT IN EITHER OF THE BLADES WILL PRODUCE AN UNBALANCED CENTRIFUGAL FORCE, CAUSING VIBRATIONS.

THE APPARATUS CONSISTS OF A BEAM FITTED WITH KNIFE-EDGES RESTING IN STEEL BEARINGS. AN ACCURATELY TURNED SPINDLE IS ARRANGED TO BE AXIALLY IN LINE WITH THE KNIFE-EDGES, AND A LOOSE GUN METAL SLEEVE TURNED TO SUIT THE PROPELLER IS FITTED OVER THIS.

THE PROPELLER TO BE TESTED IS THREADED ON TO THE SLEEVE AND SET TO DIFFERENT ANGLES, SO AS TO DETERMINE THE AMOUNT OF UNBALANCE. THIS IS SHOWN UPON THE GRADUATED QUADRANT, AND INDICATES THE AMOUNT OF MATERIAL TO BE REMOVED.

WRITE FOR LIST NO. L2 TO-DAY TO—

W. & T. AVERY LTD
SOHO FOUNDRY
BIRMINGHAM, ENGLAND.



No. 540
Avery Propeller Balancer

Ad. 607

CANADIAN CARBIDE GIVES MORE GAS PER POUND

AND GAS IS WHAT YOU ARE BUYING

Export Drum with Wood over Cask

Years of manufacturing experience, plus facilities for quantity production assure highest gas yield and moderate prices.

CANADA CARBIDE CO., LTD.

Power Building, MONTREAL, CANADA.

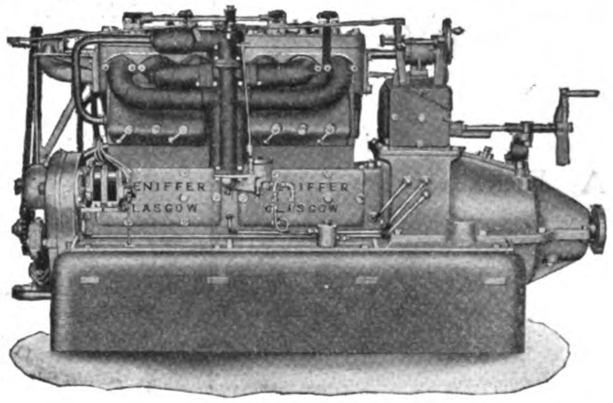
Manufacturers and Exporters of

"S" BRAND HIGH-GRADE CARBIDE OF CALCIUM

Cable Address: CARBIDE, Montreal, Canada
Western Union, Bentley's and A.B.C. 5th Edition Codes.

GLENIFFER

KEROSENE & PETROL MARINE MOTORS



FOR ALL TYPES OF BOATS

RANGE OF MODELS—10 TO 90 H.P.

AGENTS:—**Douglas and Grant Ltd.—at Madras, Rangoon, Bangkok, Saigon, and Haiphong.**
Ritchie and Bisset—at Singapore.
British and Dutch Engineering Co., Ltd.—at Batavia and Soerabaia.

GLENIFFER MOTORS LTD.

ANNIESLAND, GLASGOW, SCOTLAND.

TELEGRAMS: "GLENGINE, GLASGOW."

SALE & FRAZAR

LIMITED
No. 1 Yayesucho, Kojimachi-Ku
TOKYO
Central Post Office Box No. 18

IMPORTS — EXPORTS

Telegraphic Address: "FRAZAR"
Since 1834 The Name "FRAZAR" For All Offices has been Connected
WITH

ORIENTAL TRADE

BRANCHES - - - - Yokohama, Kobe, Osaka, Kyoto, Moji, Hakodate, Nagoya, Keijo (Korea), Taihoku (Formosa), Mukden (Manchuria), Vladivostok (Siberia.)

AFFILIATED COMPANIES -
FRAZAR & CO., 30 Church St., New York, and Paris, Seattle, San Francisco.
FRAZAR TRUST CO., LTD., Tokyo and Yokohama.
FRAZAR FOREIGN TRADE BUILDING CO., New York.

CORRESPONDENTS - -
SALE & CO., 21 Old Broad St., London, E.C.
F. G. SALE & SONS, 20 Bishops Gate, London, E.C.
E. W. FRAZAR & CO., 5 Rue de Paris, Tientsin and Peking, Harbin, Mukden.

WORLD-WIDE CONNECTIONS
EXCLUSIVE AGENCIES IN ALL LINES
LARGE STOCKS

A FEW OF OUR AGENCIES

MOTORCARS, TRUCKS, TRACTORS, ETC. Ford Motor Co., Hupmobile Motor Car Corp., Franklin Motor Car Co., Armstrong Siddeley Co., Ltd., Rolls Royce Co., Ltd., The White Co. (Trucks), Splitdorf Electrical Co.
MACHINE TOOLS. Joseph T. Ryerson & Son, Giddings & Lewis Mfg. Co., Wm. Sellers & Co., Inc.
RAILWAY EQUIPMENT. Baldwin Locomotive Works, W. H. Miner, Griffin Wheel Co., Duff Mfg. Co.
AVIATION EQUIPMENT: Handley Page, Ltd.
BRITISH STEEL and STEEL PRODUCTS. Jonas and Colver, Ltd., Smith & Coventry, Ltd., Sheffield Twist Drill & Steel Co., Ltd., Chubb & Son's Lock & Safe Co., Ltd.
CANNING MACHINERY and EQUIPMENT. American Can Co., Adriance Machine Works, Anchor Cap & Closure Co., Burpee and Letson Ltd., Seeley Brothers.
CANNED SALMON and CRAB from Kamchatka.
Fairbanks Morse & Co. Stationary and Marine Engines. Motors, Pumps, Wind Mills, complete Power and Lighting Plants.
Chain Belt Co., "Rex" Concrete Mixers.
J. L. Mott Iron Works, Plumbing Fittings and Supplies.
Shepard Electric Crane & Hoist Co., Cranes and Hoists.
Armour & Co., Canned Meats and Fruits, Soaps, Toilet Articles.
The Carnation Milk Products Co., "Carnation Cream."
The Glidden Co., Paints, "Jap-a-lac" Auto Finishes, Cold Water Paints, Wood Stains.
The Duratex Co., "Duratex" Leather Substitute and Rubber Coated Top and Curtain Materials.
S. C. Johnson & Son, Floor Wax, Paste, Liquid, and Powder.
The Klein Manufacturing Co., Technical Paints "Metal Crete" Concrete Hardeners, Cement Coating.
The Tungsten Wire Works (Stockholm), Wires for Filaments.
The Victor Talking Machine Co., Machines and Records.
The Graphoscope Development Co., Projectors and Films.
The Victor Typewriter Co., Standard Typewriters.
The Corona Typewriter Co., Folding Typewriters.
The Rolex Watch Co., Ltd., "Rolex" Watches.
Simmons Hardware Co., "Keen Kutter" and "Oak Leaf" Brands of Tools and Cutlery.
The Gillette Safety Razor Co., "Gillete" Blades.

MANY OTHER EXCLUSIVE AGENCIES

ROAD, EXCAVATING, POWER HOUSE, REFRIGERATING MACHINERY: STEEL and IRON PRODUCTS: "Gould" STORAGE BATTERIES.
RADIO APPARATUS, HEATING EQUIPMENT, FERTILIZERS, SAWN TIMBER CHEMICALS.
OUR SERVICE also covers BONDS and INVESTMENTS, FIRE and MARINE INSURANCE, SHIPPING, STORING, CHARTER, SALE and PURCHASE of STEAMERS.

INQUIRIES SOLICITED - If we cannot Supply your Requirements from Stock, we will be pleased to Recommend Local Alternatives or Advise Regarding Imports.

FIREPROOF
Ambler
Asbestos Corrugated Roofing

Made of selected asbestos fibres and the best hydraulic cement, compressed into compact sheets under three thousand pounds pressure per square inch, Ambler Corrugated Roofing and siding cannot burn, rust, rot, split nor leak. Made in sheets twenty-seven and one-half inches wide with eleven complete corrugations, and in lengths of four, five, six, seven, eight, nine and ten feet to be applied directly on purlins with lead washers and either bolts or aluminium tie wires, furnished. This material is unaffected by heat or cold or climatic conditions. Send for our data sheets showing method of use. Address all inquiries to Export Department "B."

"Permanent as the Everlasting Hills"

NO PAINTING—NO REPAIRING

Manufactured by

**Asbestos
Shingle, Slate & Sheathing
Company**

Ambler, Penna., U.S.A.

Distributors Wanted throughout the East

Cable Address: " IWASAKISAL-TOKYO "

Code Used : A. 1., A.B.C. 5th, Western Union, Bentley's Complete Phrase

MITSUBISHI SHOJI KAISHA, LTD.

(MITSUBISHI TRADING CO., LTD.)

Capital, fully paid-up - - - Y. 15,000,000

***Head Office*:**

MARUNOUCHI, TOKYO.

Importers and Exporters, Manufacturers, Commission Merchants, Brokers, Ship Owners.

EXPORTING:

Coal, Copper and all Other Descriptions of Metals, Minerals and Cereals, Chemicals, Oil, Paper, Glass, Canned Fish, Silk Goods, and General Oriental Products and Merchandise

IMPORTING:

Iron, Steel, Machinery, Machine Tools, Chemicals, and General Merchandise

ANNUAL PRODUCTION:

Electrolytic Copper Ingots	20,000	Tons
Pig Iron	100,000	,,
Steel	50,000	,,
Coal	3,500,000	,,

COLLIERIES:

Takashima, Ochi, Yoshinotani, Kishidake, Namazuta, Shinnew, Hojo, Kanada, Kamiyamada, Ashibetsu, Bibai, O-Yubari, and Sakito

BRANCHES and AGENCIES:

Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle

STEAMSHIP DEPARTMENT—KOBE

Fleet Owned	25,000	Tons Gross
Chartered Steamers	12,000	,, ,,

Regular and Irregular Routes between home ports and Chinese and South Sea Islands Ports, etc.

MIIKE COAL

The Finest Steaming and Bunker Coals of the Far East are mined from the famed Miike, Tagawa, Yamano Sunakawa and Kawakami Collieries operated by the

MITSUI

MINING COMPANY, LTD.

HEAD OFFICE:

No. 1 Surugacho, Nihonbashi-Ku, TOKYO, JAPAN

Capital - - Yen 100,000,000

Annual Coal Output is equal to one-quarter of Total Japanese Mines.

LEAD, SILVER, GOLD, ZINC, COPPER, SPELTER, SULPHUR, COKE, IRON, CHEMICALS and DYES

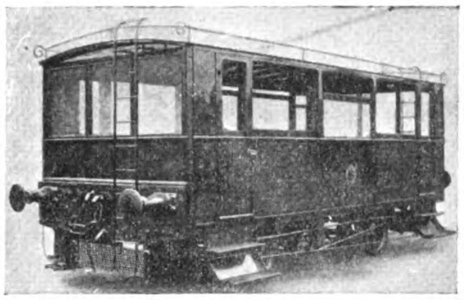
Are produced from the Company's, KAMIOKA, Lead, Silver and Zinc Mine; SANO, Copper and Zinc Mine; KUSHIKINO, Gold Mine; KONGO, Tungsten Mine; IWAONOBORI, Sulphur and Metal Mine; Zinc Plants, Coke, Dyestuffs and By-products Establishments in Miike.

***Sole Agents for our Products*:**

MITSUI BUSSAN KAISHA, Ltd.

(MITSUI & Co., Ltd.)

Tokyo, London, New York, Shanghai, Hongkong, and other Principal Commercial Centres of the World.



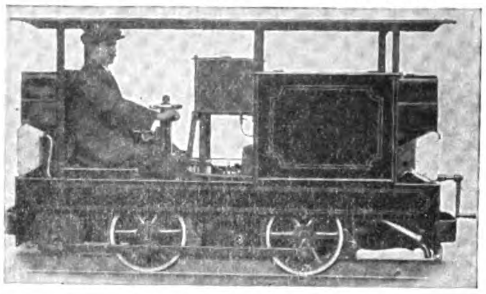
Contractors to: **The Admiralty, The War Office, The India Office, The Crown Agents for the Colonies, Colonial and Foreign Governments**

Internal Combustion Rail Cars, Inspection Cars, Coaches, Tramcars, Trailers, Locomotives, Tractors, etc.

British built throughout and supplied to upwards of 200 Railways in all Parts of the World

Designs to meet individual requirements

Passenger Freight Shunting | Mining Harbours Docks | Plantations Logging Contractors



The Drewry Car Co., Ltd.

(and McEwan Pratt & Co., Ltd.)

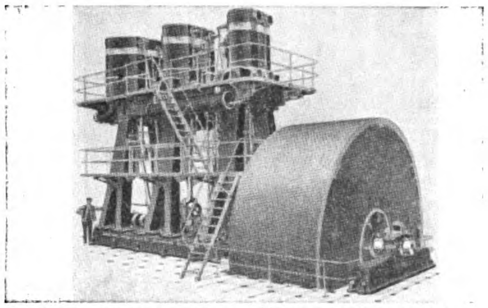
13 South Place, London, E.C. 2

Telegrams: "Effervesce, London"

Works: Burton-on-Trent, England

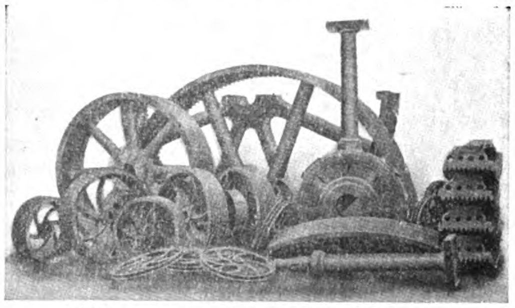
ASHTON FROST & CO., LTD.

ESTABLISHED 1873.



MAKERS OF

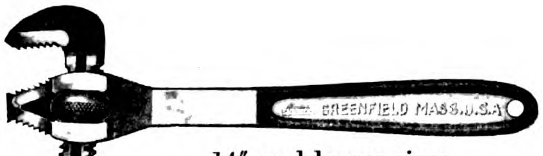
STEAM ENGINES,
MILL GEARING,
DEEP WELL PUMPS,
SEWAGE PLANT,
ETC.



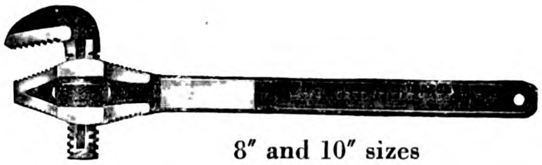
TELEGRAMS: "FOUNDRY."

WORKS: **BLACKBURN, ENG.**

Little Giant—The New Pipe Wrench



14" and larger sizes



8" and 10" sizes

A new design which gives increased strength, increased simplicity, increased usefulness, *less* weight, and fewer parts.

The "*Little Giant*" Pipe Wrench has become popular at once because of the end opening jaws. It can be thrust straight on a pipe like a pair of pliers, and will be found useful in places which are beyond the reach of an ordinary pipe wrench.

The arrangement of the jaw, which can be engaged at will with 2 or 4 sets of teeth on the handle can be seen in the picture. These extra sets of teeth mean long life. The "*Little Giant*" Wrench is drop-forged and heat-treated throughout.

Merchants will be particularly interested in the light weight (less than an ordinary pipe wrench) and the few parts. The "*Little Giant*" has only 3 parts, which means a smaller investment in replacements. Any of our representatives will be glad to quote prices.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASS., U.S.A.

Canadian Plant: Greenfield Tap & Die Corporation of Canada, Limited, Galt, Ontario.

Cable address: "Getede"

MULLER, PHIPPS & SELLERS, LTD.
17 Itachibori Kitadori 5-chome, Nishi-Ku Osaka, Japan
Fudo Bank Bldg., 9.2-chome Honkokucho, Nihonbashiku Tokyo, Japan

MULLER & PHIPPS (CHINA) LTD.
5 Ice House St.
P. O. Box 25, Prince's Bldg., Hongkong, China
1 B Jinkee Road Shanghai, China

DODGE & SEYMOUR (CHINA) LTD.
89-91 Rue Montauban, Shanghai, China

HORNE COMPANY LTD.
63 Rue de Baron Gros, Tientsin, China
6-7 Takayama-cho Kyobashi-Ku Tokyo, Japan

Plants of GTD Corporation, World's Largest Manufacturers of Screw-threading Tools

The Green Island Cement Co., Ltd.

SHEWAN, TOMES & CO.,

GENERAL MANAGERS, HONGKONG

BEST PORTLAND CEMENT — EMERALD BRAND — GREEN ISLAND CEMENT Co. (LIMITED)

Are You Going to Build?

Insist on your Architect specifying the use of the best brand of Portland cement in construction. If the house or factory is to be blocks or tiles, they should be of concrete, if stucco, only the best cement should be employed; if reinforced concrete is used, only a standard cement will stand the test; if your building is to be fireproof, waterproof, safe against earthquake or typhoon, improving with age, and lowering the cost of insurance, you must employ concrete, and the best concrete construction is only secured through the use of

Green Island Cement

Green Island Cement is supplied in Bags = 250-lbs. net, Casks = 375-lbs. net, Iron Drums = 375-lbs. net.

Also, Glazed Stoneware, House Drains, Sewer Pipes, and Fittings, Paving Bricks, Tiles, Fire Bricks and Fire Clay.

The Green Island Brand has become the standard Portland Cement of Asia, owing to its purity, uniformity and tests.

Used by H.B.M.'s Government in Hongkong, United States Government in the Philippines for all important Public Works.

Also by H.B.M.'s Government in Singapore and Federated Malay States for Government Buildings, Railways and Harbour Works.

Established 1883 — Telegraphic Address "ROPEWORK," HONGKONG

THE HONGKONG ROPE MANUFACTURING Co., Ltd.

Manufacturers of Pure Manila Hemp Rope

Rope supplied to the British Navy on the China Station and to all Mail and regular Steamship Lines.

Ropes, Cables and Hawsers ½-in. to 15-in. Circumference. Driving Ropes for Mills; Bull Ropes and Drilling Cables for Oil Wells a Specialty.

SHEWAN, TOMES & CO.

General Managers

St. George's Building — HONGKONG.

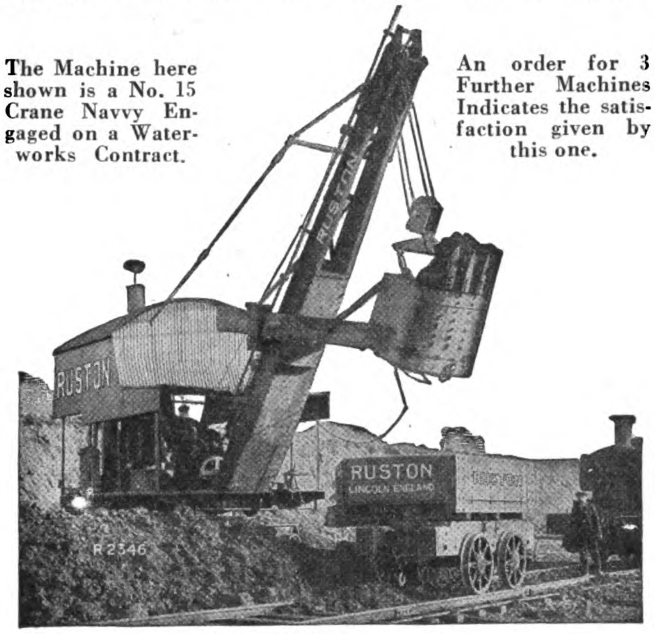
ECONOMICAL EXCAVATIONS

RUSTON EXCAVATORS—Crane Navvies Shovels, and Draglines have proved their efficiency on all classes of excavations in all parts of the world.

Wide Range of Machines available on Rail Wheels, Road Wheels or Caterpillar Tracks.

The Machine here shown is a No. 15 Crane Navvy Engaged on a Waterworks Contract.

An order for 3 Further Machines Indicates the satisfaction given by this one.



Full particulars from:—

RUSTON & HORNSBY LTD., LINCOLN, England.

OR

MARTIN & CO., CALCUTTA.
ARNHOLD BROTHERS & CO., LTD., SHANGHAI.
UNITED ENGINEERS LTD., SINGAPORE.

The JANNEY-PENN Coupler

THE latest development of the Janney type of M. C. B. Coupling originally introduced and promoted by this company. This coupler has all the simplicity of the early type of the Janney coupler, and also has the up-to-date features of a "Lock-to-the-Lock," "Lock-Set," and a "Knuckle-Opener," and complies fully with all the requirements and recommendations of the M. C. B. Association of the U. S. A.

This coupler has the desirable feature of easy accessibility of parts, thus facilitating the making of repairs.

Furnished with various designs of rear end to suit different types of Draft Rigging.

Manufactured exclusively by

THE McCONWAY & TORLEY CO.

Pittsburgh, Pa., U. S. A.

Cable Address—Torley, Pittsburgh

China Agents: The Fearon, Daniel Co., Tientsin, Peking, Hankow and Shanghai, China

For oxygen, acetylene, hydrogen, carbonic acid, nitrous oxide, sulphur dioxide, liquid chlorine, blaugas, etc.

Manufactured rigidly to standard British and American specifications, with safety and endurance factors beyond requirements.

Made from Wharton Special Cylinder Steel billets. Six exacting inspections during manufacture and a final hydrostatic test, all made by competent, disinterested inspectors. Official test certificates furnished. Delivered promptly, complete, with or without caps and valves.

Full specifications, sizes, weights, test pressures and prices upon request.

This company is a subsidiary of the Taylor-Wharton Iron & Steel Company, established 180 years ago, manufacturers of manganese steel frogs, switches, crossings, gears, pinions, dipper teeth, buckets, crushing and grinding machine parts, etc.

Representatives Desired for Wharton Cylinders

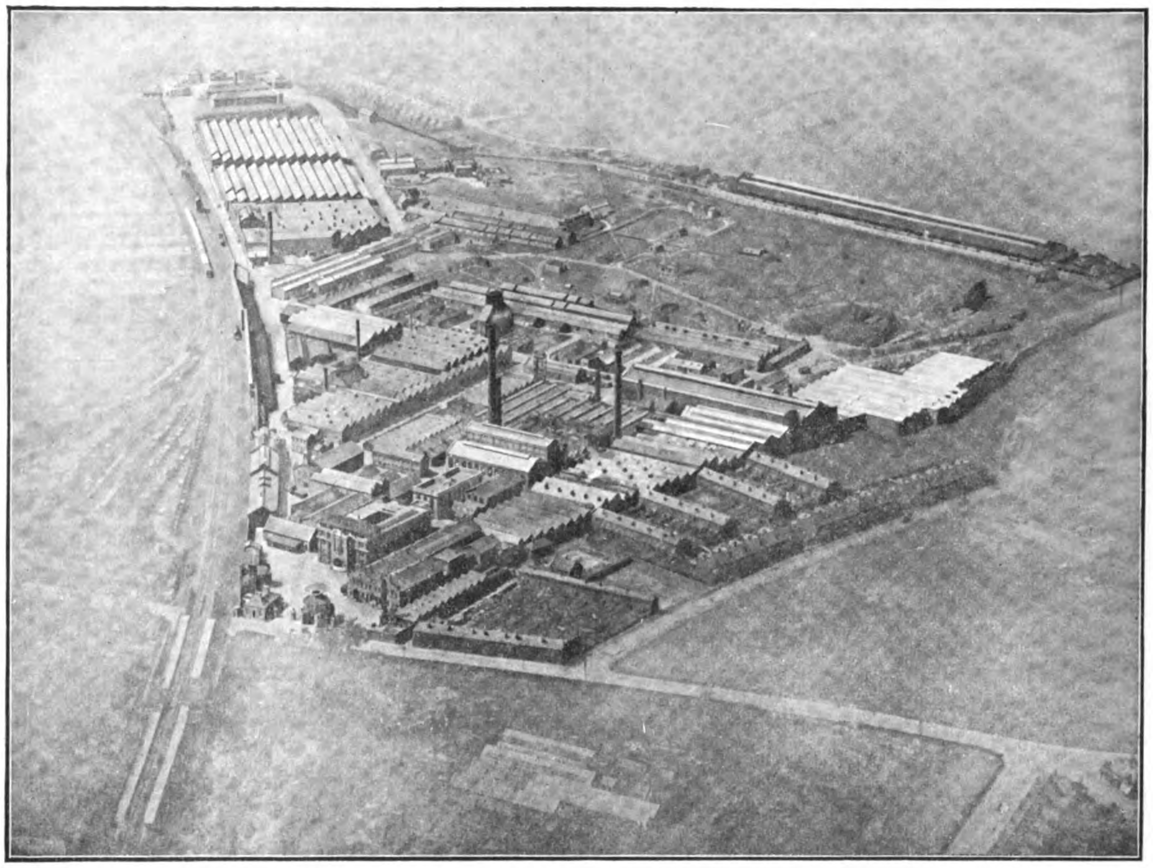
We desire to correspond with concerns and individuals with regard to representing us. Our facilities, in both manufacturing and service, our reputation, stability and the worth of our products make this an unusual opportunity. Please give full particulars.

Wm. Wharton, Jr. & Co., Inc.

(Founded 1859)

30 Church St., New York, U. S. A.

Cable, Wilwharton, New York



FAMOUS FACTORIES. KYNOCH'S WORKS AT WITTON.

At Lion Works, Witton, Birmingham, are the Headquarters of the Metal and Engineering Section of Nobel Industries Ltd. The foundations of these Works were laid in 1862 by Mr. George Kynoch ; from a modest beginning, the organisation now includes the largest Small Arms Cartridge Factory in the country, a weekly output of 25,000,000 rounds of rifle ammunition having been maintained during the War, apart from other equipment.

Peace time products, including Sporting Ammunition, Motor Accessories, Wickless Stoves, Blow Lamps and Lanterns, Nails and Tacks, Power Presses, etc., are produced in the Factory, while the Foundry and Rolling Mills render the Works self-contained for supplying manufacturers with non-ferrous metals in any desired form from the ingot stage onwards, a speciality being made of brass, bronze and copper bars, strips, sheets, etc.

At Witton, Kynoch Bicycles, Handlebars, Bells and other Accessories are also made, and an adjacent Factory produces Toilet Soaps and Candles.

Other products manufactured at the Factories controlled by Nobel Industries Ltd. include Blasting Explosives and Accessories, Industrial Collodions and Chemicals, Incandescent Mantles, Bronze and other Metal Powders, Art Leather Cloth, Thermit Welding, etc. Particulars can be obtained from

NOBEL NOBEL INDUSTRIES LIMITED NOBEL

Head Office :

NOBEL HOUSE, LONDON, S.W.1

Write to the Advertising Department, Nobel House, for illustrated booklet "The Products of Nobel Industries, Ltd." mentioning this Journal.

UNITED STATES STEEL PRODUCTS COMPANY

30 Church St., New York, U.S.A.

Sole Exporters of the Products of

Carnegie Steel Company
Illinois Steel Company
American Steel & Wire Company
American Sheet & Tin Plate Company
The Lorain Steel Company
American Bridge Company
National Tube Company
Tennessee Coal, Iron & Railroad Company
Minnesota Steel Company
Canadian Steel Corporation
Chickasaw Shipbuilding and Car Company

BRANCH OFFICES and REPRESENTATIVES IN

Antwerp, Belgium
Birmingham, England
Bombay, India
Brussels, Belgium
Buenos Aires, Argentine Republic
Calcutta, India
Concepcion, Chile
Glasgow, Scotland
Havana, Cuba
Johannesburg, South Africa
Lima, Peru
Los Angeles, California
London, England
Mexico City, Mexico
Montreal, Canada
New Glasgow, Canada
New Orleans, La
Peking, China
Port Elizabeth, South Africa
Portland, Oregon
Rio de Janeiro, Brazil
Rome, Italy
Rotterdam, Holland
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Seattle, Washington
Soerabaya, Java
Sydney, New South Wales
Tokio, Japan
Toronto, Canada
Valparaiso, Chile
Vancouver, Canada
Winnipeg, Canada

WAREHOUSES AT

Antwerp, Belgium
Bombay, India
Buenos Aires, Argentine Republic
Calcutta, India
Callao, Peru
Port Elizabeth, South Africa
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Talcahuano, Chile
Valparaiso, Chile

We give prompt attention to inquiries for all class of our Steel Products, including the following :—

Aerial Tramways—Reversible, specially designed
Alloy Steel
Alloy Steel Sheets
Ammonia Cylinders
Angles
Armature Sheets
Axles—Locomotive, Railroad and Tramway Cars
Bamboo Steel
Barbed Wire
Bars—Merchant and Concrete Reinforcement
Billets
Black Sheets
Blooms
Boiler Tubes, Lapwelded and Seamless
Bolts and Nuts
Bridges—Railway, Highway, specially designed
Buildings—Steel Warehouses, Structural Steel for Buildings
Cables—Steel Hoisting and Haulage Cables
Cars—Steam Railway, Mine and Industrial Railway Cars
Car Angles
Car Wheels
Channels
Cold Rolled Flat Wire
Copper Rail Bonds
Copper Bearing Steel Sheets
Derricks
Drilling Machines
Drilling Rigs for Oil Wells
Duguesne Rail Joints
Electrical Sheets
Electrical Wires and Cables—Bare and Insulated
Fabricated Structural Material for Bridges, Turntables, Steel Buildings, etc.
Fencing Materials—Wire Fencing, Steel Posts
Forgings
Frogs and Switches—Steam and Electric Railways
Hoops and Bands
Machine Forgings
Mine Timbers
Nails—Wire
Nail Rods
Nail Wire
Pig Iron
Piling—Steel Sheet
Pipe—Black and Galvanized Wrought, for Steam, Gas and Water, American or English Threads; Lapwelded Boiler Tubes, Matheson Lead Joint Pipe, Seamless Steel Tubing
Plates—Boiler, Tank, Ship, Flange and Fire Box Steel
Poles—Steel Tubular
Rails—Light and Heavy Rails for Railways, Tramways, Mine and Industrial Railways. Special Track Work
Reinforcement for Concrete—Triangle Wire Mesh
Rivets
Rope—Wire for Mine Hoists, Derricks, Cranes, etc.
Screw Spikes
Screw Stock—Cold Drawn
Shafting
Shapes—Standard Structural
Sheet Bars
Sheets—" Apollo " Brand, Galvanized, Corrugated and Plain
Skelp
Slabs
Spikes—Railway Track Spikes
Sleepers—Steel
Spring Steel
Steam Pipe and Tubes
Stove Pipe Sheets
Switches and Switch Stands
Tank Plates
Terne Plates
Tin Mill Products
Tin Plate—" Coke," " Charcoal " and " Terne "
Tool Steel
Towers—Steel
Triangle Mesh Concrete Reinforcement
Tubes—Gas, Water, Steam and Boiler
Turntables for Light and Heavy Railway Service
Upholstery Springs
Washers
Weatherproof Insulated Wires and Cables
Wheels—Solid Rolled Steel for Steam, Electric, Mine and Industrial Railways.
Wire—Bright, Annealed, Galvanized, Baling and Fencing and all Classes of Coated and Uncoated for Manufacturing Purposes.

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE: Union Building—The Bund and Canton Road

PEKING OFFICE: No. 22 Wu Liang Ta Jen Hutung

TOKYO OFFICE: No. 15 Nakadori, Marunouchi

OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President:
Baron K. Okura

BRANCHES at Hakodate, Yokosuka, Yokohama, Osaka, Kobe, Maizuru, Kure, Moji, Saseho, Keelung, Taihoku, Seoul, Antung, Penhsihu, Mukden, Tientsin, Peking, Hankow, Changsha, Kiukiang, Tsingtau, Hongkong, Vladivostok, Sydney, San Francisco, New York, London.

Head Office:
Ginza, Tokio

GENERAL IMPORTERS AND EXPORTERS

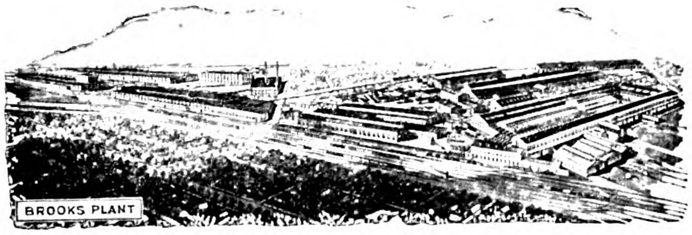
Rails, Bridges, Locomotives and other Railway Supplies
Electric Plants, Electrical Supplies
Sugar Plants, Spinning Machinery, Machine Tools
Factory Equipments, and all kinds of Machines
Automobiles, Guns and Explosives
Structural Materials, Steel Materials, Metals
Mineral Products, Chinese and Japanese Produce, Silk
Cotton, Wool, and their Manufactures
Fertilizers, Chemicals, Vegetable Oils and Wax, Dye Stuffs
Food Stuffs, Hides and Fur, Skins, Pen-hsi-fu Smokeless Coal and Pig Iron, etc.

BUILDING AND CIVIL ENGINEERING CONTRACTORS,
INSURANCE AGENTS

Yih Chong Wharf (Okura)

POOTUNG, SHANGHAI

LOCOMOTIVES



Our organization is equipped to furnish every facility which long experience and abundant capital can provide for producing high-class work, and for conducting the business of manufacturing locomotives on the most economical basis to both purchaser and manufacturer.

American Locomotive Sales Corporation

New York City

Telegraphic Addresses :

Locomotive : Peking, China — Bamco : Sydney, Australia

Mitsui : Tokio, Japan — Nottac : Manila, P.I.

Dilpax : Honolulu, Hawaii

MITSUI BUSSAN KAISHA

Cable Address: "MITSUI"

Capital: Yen 100,000,000
Reserve: „ 30,000,000

LIMITED

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

IMPORTERS AND EXPORTERS

SHIPOWNERS AND SHIPBUILDERS

Head Office: TOKYO, JAPAN

Branches:

HOME—Yokohama, Nagoya, Osaka, Kobe, Otaru, Muroran, Hakodate, Niigata, Moji, Wakamatsu, Kuchinotsu, Nagasaki, Karatsu, Miike, Taipeh, Keelung, Tainan, Takow, etc., etc.

ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soerabaya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc., etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc , etc.

IMPORT.

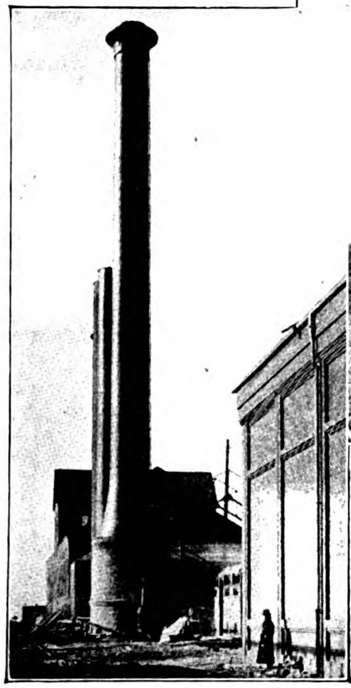
Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

ENGINEERING DEPARTMENT

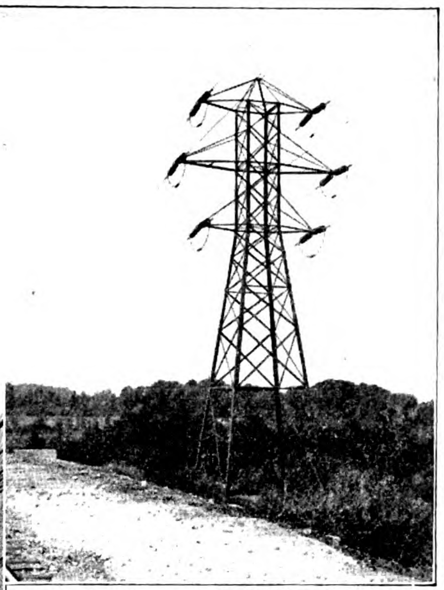
Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Export Co.
Manning Maxwell & Moore, Inc.
Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc., etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



New England Gas Co.
200-Ft. Stack



Mississippi River Power Co., Keokuk Iowa

McClintic-Marshall Products Co.
Works: PITTSBURGH, U.S.A.
Foreign Contract Department, 50 Church Street NEW YORK, U.S.A.

Cable Address — "Macmarsh" New York
Codes — Bentleys, General, Western Union, Lieber

England: George A. Smith, St. Stephen's House, Westminster, S. W. 1. London
France: Produits Metallurgiques McClintic-Marshall, 8, Rue Edouard VII, Paris
South Africa: Robertson & Moss, 11-17 Trust Building, Johannesburg
China: Lam, Glines & Company, 4-B Peking Road, Shanghai
Japan: H. E. Root, 73 Yamashita-cho, Yokohama
Cuba: San Ignacio y Obrapia, Havana

We Design, Manufacture and Erect

Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.

McClintic-Marshall
Annual Capacity, 400,000 Tons

Our Standard of Production

For over twenty years there has been but one standard by which our steel construction has been judged—one which permitted no tolerances but insisted on exact performance.

Bridges, pipe lines, buildings, complete industrial plants—400,000 tons per annum—our inspectors, ever at work, have ensured complete satisfaction first for ourselves and then for our clients.

Let us take in hand your next steel construction job.

Write for booklet No. 30

McClintic-Marshall

Steel Construction

MACHINERY for Manufacturing Tin Cans—Tin Ware—Metal Packages Cutlery—Hardware—Aluminum Ware and Enamel Ware—Electrical Equipment. Also Horseshoe—Minting and Drop Forging Machinery

1857 BLISS 1922

BLISS No. 21-A Armature Disk Press—For accurately and rapidly punching armature disks for small motors and generators.

BLISS machinery is extensively used in the manufacture of electrical parts made of sheet metal, such as armature disks, parts of electric motors, dynamos and switches, lamps and lamp sockets, call boxes, switch boxes, electric irons, electric heaters, electric lighting fixtures and many other parts used for electrical work and appliances.

BLISS sheet metal working machinery is machinery plus a knowledge and experience gained in 65 years of specializing in this particular line of machinery. It insures you economical production.

Write us your requirements, sending samples or drawings of the parts to be produced and state daily production required of each piece.

" BLISS " on your machinery is more than a name; it's a guarantee.

E. W. BLISS CO. MAIN OFFICE AND WORKS **BROOKLYN, N. Y., U. S. A.**

American Factories: BROOKLYN, N.Y. HASTINGS, MICH. CLEVELAND, OHIO. SALEM, OHIO.

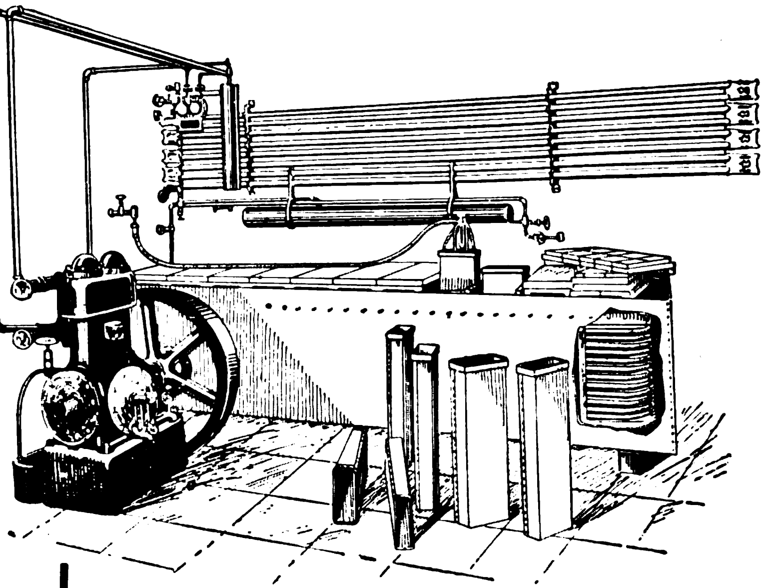
FOREIGN SALES OFFICES AND FACTORIES:

ENGLAND, Pocock St., Blackfriars Rd., S. E., London — ITALY, 345 Via Nizza, Turin — FRANCE, 54 Blvd. Victor-Hugo St. Ouen, Paris

FOREIGN REPRESENTATIVES:

INDIA — Alkin and Duff Eng. Co., Clive Bldg., Calcutta
CHINA — Allied Machinery Co. of America, Shanghai, Tientsin, Dairen, Manchuria
JAPAN — Horne Co., Ltd. Tokyo, Osaka

No. 249



Type of belt-driven machine for all cooling and ice-making purposes

YORK ICE MACHINERY

FOR

Ice Making Refrigeration Cold Storage

Large hotels, hospitals, dairies, meat markets and other large consumers of ice will find a substantial saving and great convenience in using ice from their own plant

Place your order now to allow time for installation

Andersen, Meyer & Co., Ltd.

SHANGHAI OUTPORTS

STANDARD OIL COMPANY OF NEW YORK

26 Broadway New York

SO
SOCONY
TRADE MARK
NY
行孚美
STANDARD OIL CO. OF NEW YORK

The Mark of Quality

SOCONY PRODUCTS

Illuminating Oils Lubricating Oils

Gasoline and Motor Spirits

Lamps, Stoves and Heaters

Road Oils and Material for Road Building

Paraffine Wax and Candles

BRANCH OFFICES IN PRINCIPAL CITIES OF

Japan
China
Indo-China
Siam
Philippine Islands
Straits Settlements
Netherlands India
India
South Africa
The Levant

THE

HONGKONG & WHAMPOA DOCK CO.

LIMITED,

HONGKONG

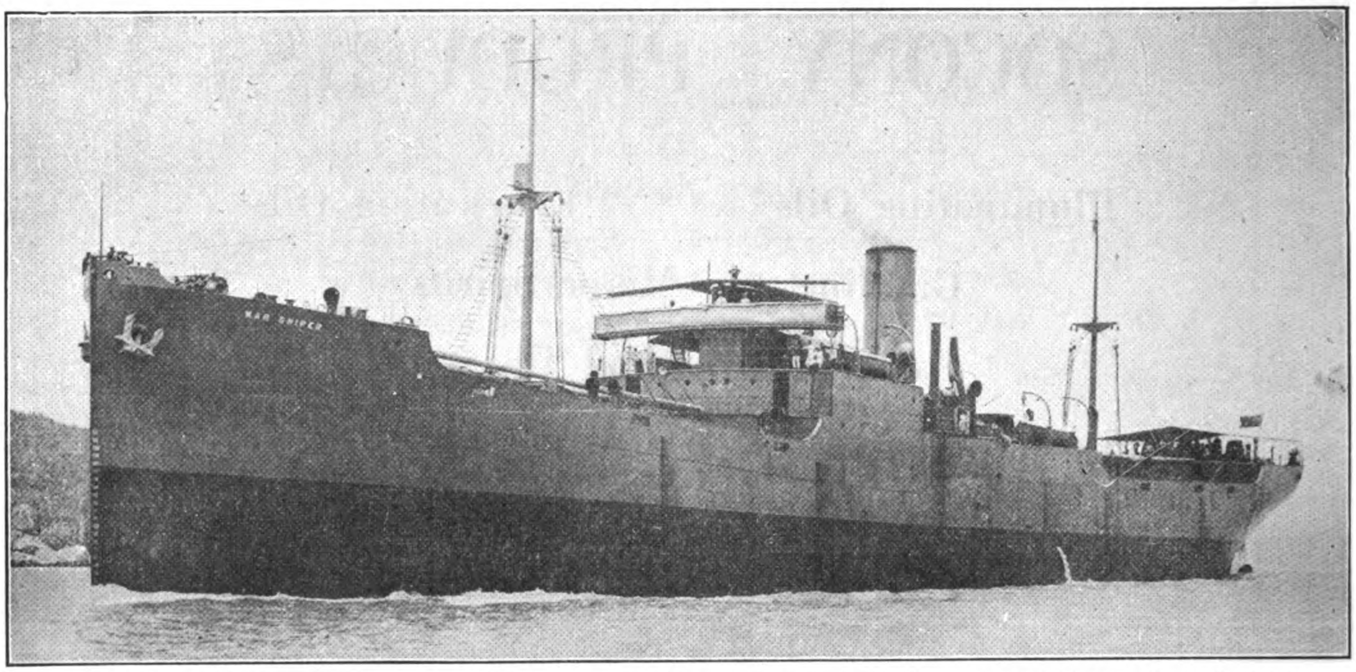
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

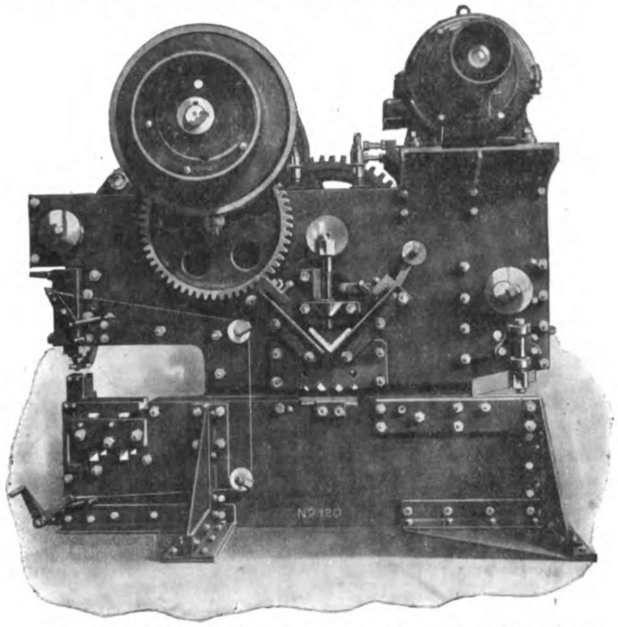
TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

With Steel Plate or Cast Iron Frames



Punching, Plate Splitting and Bar Cropping Machine

Punching and Shearing Machines.
Plate Bending Machines.
Plate Straightening Machines.
Plate Edge Planing Machines.
Plate Shearing Machines.
Steam Bending and Straightening Machines.
Bar Cropping Machines.
Multiple Punching Machines.
etc. etc.

CRAIG & DONALD LIMITED

Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LTD.

PATENT

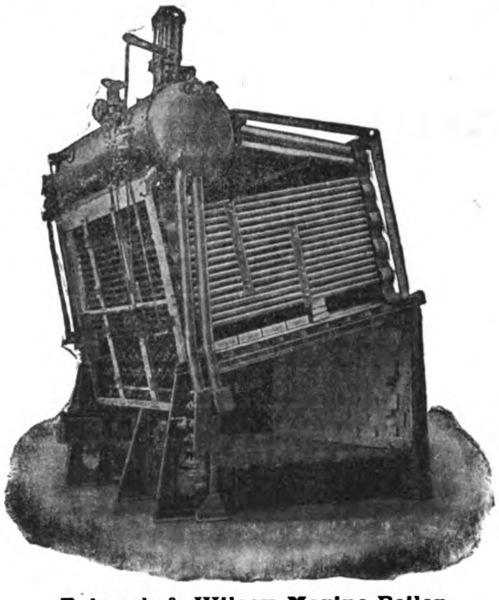
WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES, AND FOR BURNING ANY KIND OF FUEL

13,400,000 H.P. Land type For Stationary Purposes—**6,400,000 H.P.** Marine-type Afloat

MANUFACTURERS OF

SUPERHEATERS
FEED-WATER HEATERS
ECONOMISERS
STEAM PIPING
STRUCTURAL STEEL WORK
MECHANICAL STOKERS
STEEL CHIMNEYS
WATER SOFTENERS AND PURIFIERS
COAL-CONVEYING MACHINERY
SUCTION ASH PLANTS
ELECTRIC CRANES
GENERAL BOILER HOUSE ACCESSORIES



Babcock & Wilcox Marine Boiler

THE
BABCOCK & WILCOX
PATENT
MARINE-TYPE BOILER

as used in Battleships and Cruisers of the British, American, Danish, Italian, Spanish, Brazilian, and Argentine Navies, and in Vessels of all Classes of the Mercantile Marine.

BABCOCK & WILCOX also Supply as Joint Manufacturers and General Licensees with J. SAMUEL WHITE & CO., LTD. the WHITE-FORSTER Boiler for Destroyers, Torpedo Boats, Pinnaces, etc.

HEAD OFFICE FOR CHINA: 1 THE BUND, SHANGHAI
" " " JAPAN: I. I-CHOME, YURAKU-CHO, KOJIMACHIKU, TOKYO.

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

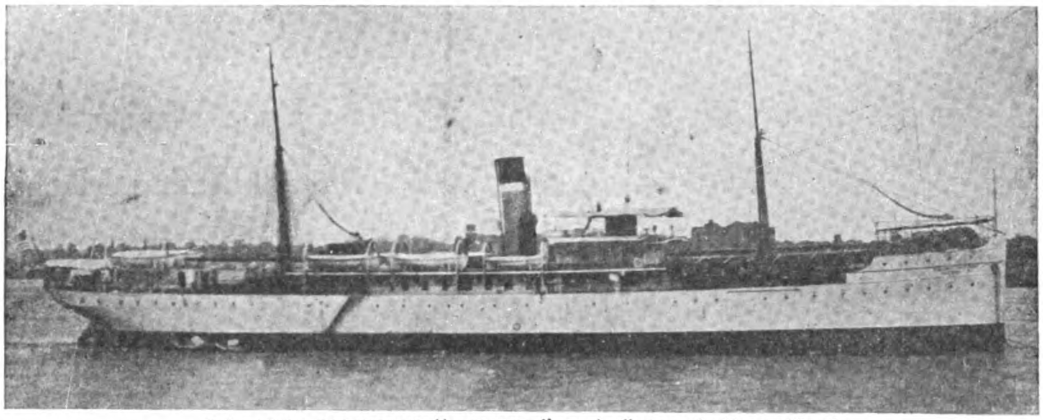
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″

Cable Address
"FARNHAM"
Codes Used,
A.B.C. 4th, 5th
& 6th Editions
A-1, Watkin's,
Scott's,
Western Union,
Bentley's
and
Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are four in number, ranging in length from 355 feet to 700 feet on the Blocks, and breadth of entrance from 53 feet to 80 feet, with a depth of water on the sill of from 16 feet to 27 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Light railway lines are laid throughout workshops and yards.

A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

Low Pressure Hot Water and Steam Heating Installations

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR
"F.B." INTERNATIONAL CODE

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

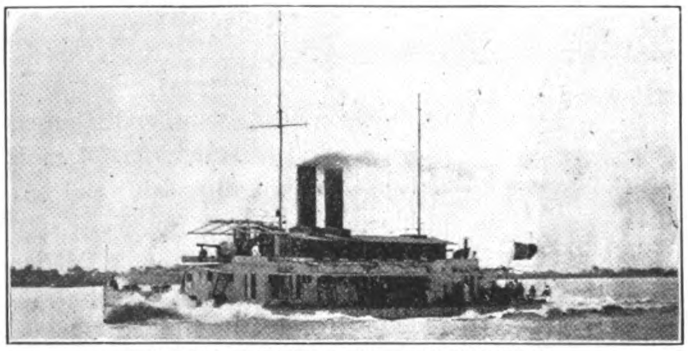
Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

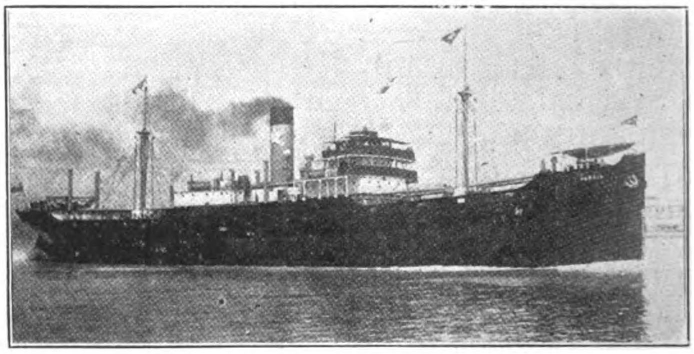
ENQUIRIES SOLICITED

PARTICULARS OF DRY DOCKS

Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock ...	700 feet	80 feet	27 feet
International Dock ...	528 ,,	77 ,,	23 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,



H.I.M.S- "ERMANNO CARLOTTO"
Designed and Constructed for the Royal Italian Navy
Length 160 feet. Twin Screw Engines.
Draft 2 feet 10 inches with full equipment and 30 tons of coal on board. Mean continuous speed 14 knots per hour.



s.s. "YANNIS" ex "WAR TIARA"
Sister Ship s.s. "PANAGIS" ex "WAR DIADEM"
Sister Ship s.s. "MELLON" ex "WAR REGALIA"
Built for the British Government.

View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

Head Office: Nagasumi-cho :: *Warehouse Office:* Midori-cho

Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
"DOCK"
Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:

No. 1	625′ × 80′ × 28′
No. 2	380′ × 50′ × 26′
No. 3	480′ × 63′ × 21½′

SHIPBUILDING BERTHS:

No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4, No. 5	680′ × 38′

WAREHOUSES:	TSUBO.
Iron Building	8,871.57
Concrete Building	1,636.99
Brick Building	2,011.72
Others	5,807.74

Directors: TOSHINOBU SUDA, Esq. *(Chairman)*, MANKICHI MIYANAGA, Esq. *(Managing Business Dept.)*, TAMATARO TOJO, Esq. *(Managing Shop Dept.)*

Agencies: NIPPON YUSEN KAISHA, London Branch. NIPPON YUSEN KAISHA, New York Branch.

All situated in Yokohama Harbour, the First Port at which Trans-Pacific Steamships arrive, and the Last Port from which they depart.

Complete Facilities for every Work and Fully Equipped up to date for

All Repairing Work. **All Engine Work.** **All New Ship Work.** **All Boiler Work.**

IRON AND STEEL TUBES

for Gas, Water, Air, Steam, Oil, Sewage, Irrigation & other purposes

Black and Galvanized Tubes and Fittings.
Boiler Tubes · Weldless Steel Tubes · Boring Tubes.
: Main Steam Pipe Installations. :
Tubular Steel Tramway & Electric Light Poles.
Ashford's Patent Tube Well Strainers.
*Steel Plates.*_____________*Steel Castings.*

STEWARTS AND LLOYDS, LTD.

GLASGOW BIRMINGHAM LONDON

SHANGHAI OFFICE: 6 KIUKIANG ROAD

The New Engineering & Shipbuilding Works, Ltd.

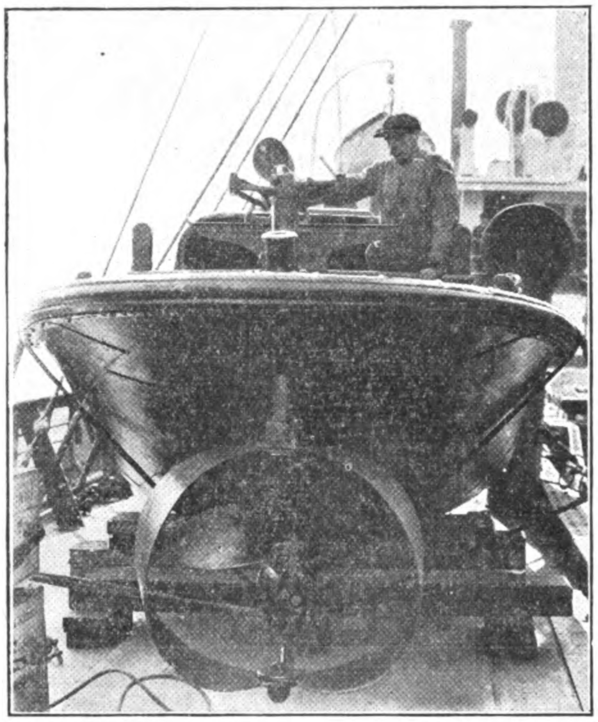
PROPRIETORS OF THE YANGTSZEPOO DOCK

Head Offices: 45 YANGTSZEPOO ROAD, Shanghai, China.

Call Flag: INTER. "A" CABLE ADDRESS: "SPEEDY"

SHIPBUILDERS AND REPAIRERS, MILLWRIGHTS, ENGINEERS, BOILERMAKERS, ELECTRICIANS, BLACKSMITHS AND FOUNDERS, SALVAGE EXPERTS, ELECTRIC AND OXY-ACETYLENE WELDERS. MANUFACTURERS OF THE "SPEEDY" MOTOR. MAKERS OF STURROCK'S PATENT FURNACE BRIDGES. MAKERS OF STEEL WINDOW CASEMENTS AND STRUCTURAL STEEL FOR BUILDINGS AND BRIDGES. MAKERS OF CARGO LIFTS.

SOLE REPRESENTATIVES FOR KITCHEN'S REVERSING RUDDERS



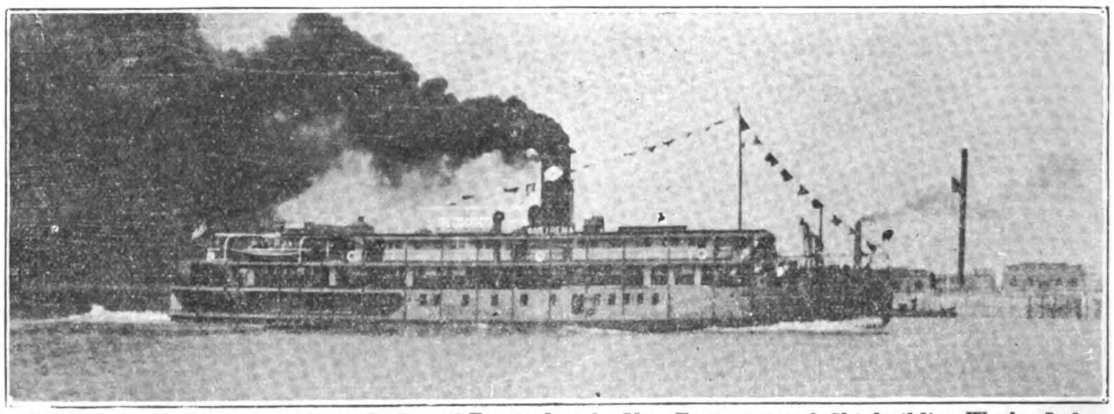
The only rudder which gives full speed control to the helmsman and allows the course of the vessel to be reversed while engines continue to run ahead.

The only rudder which entirely does away with reversing gear and clutch on motor engines and thereby improves engine efficiency and economy and reduces wear and tear considerably.

So simple that any Native can easily handle it. Particularly suitable for tugs and motor boats. Reduces all danger of manœuvring in congested waterways. Avoids any sudden pull on tow rope which might cause breakage.

Vessels Docked or Placed on Slip at Short Notice

ESTIMATES, DESIGNS AND SPECIFICATIONS, PREPARED FREE OF COST FOR THE CONSTRUCTION OF ALL CLASSES OF ENGINES AND BOILERS, CONDENSING PLANTS, STEAMERS, TOW BOATS, LAUNCHES, PONTOONS AND LIGHTERS, WATER TANKS, WATER TOWERS, ELECTRIC POWER AND LIGHT INSTALLATIONS.



200-feet Upper Yangtsze Steamer Built and Engined at the New Engineering & Shipbuilding Works, Ltd.

Repairs and Overhauls Effected Promptly, Efficiently and Expeditiously Under Foreign Supervision at Moderate Charges.

SPECIAL STAFF FOR ATTENDING TO REPAIRS AT MILLS AND FILATURES.

Cable Address:
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO.,
LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

DAIREN, N.-C.,
Dockyard & Engineering
Works

HYOGO, KOBE
Steel Foundry, Bar Mill and
Railway Shops

FUKIAI, KOBE
Plate Mill

BUILDERS OF

BATTLESHIPS, CRUISERS, TORPEDO-BOATS, DESTROYERS, SUBMARINES

ALSO, BUILDERS OF

FIRST-CLASS HIGH-SPEED OCEAN STEAMERS OF THE LARGEST SIZE AND POWER

CREOSOTED TIES

OF

PHILIPPINE TIMBER

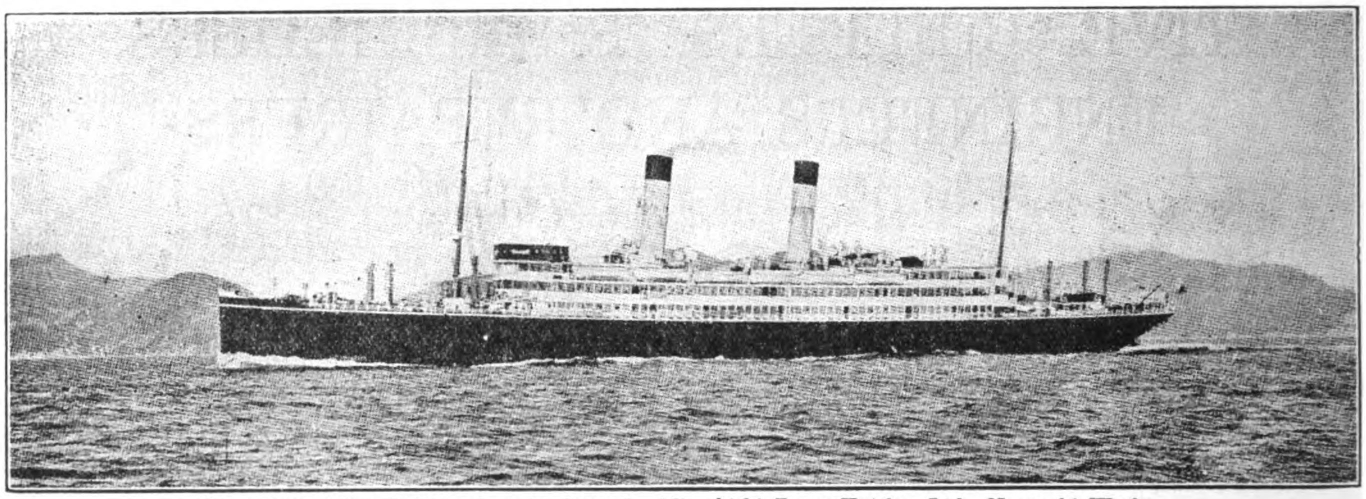
FOR

RAILROADS

ATLANTIC, GULF & PACIFIC CO. OF MANILA

77 Muelle de la Industria Manila, P.I.

Cable Address: "DREDGING"



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

DOCK No. 1			DOCK No. 2			DOCK No. 3		
Extreme Length - - - - -	523	Ft.	Extreme Length - - - - - -	371	Ft.	Extreme Length - - - - - -	728.9	Ft.
Length on Blocks - - - - -	513	,,	Length on Blocks - - - - - -	350	,,	Length on Blocks - - - - -	714	,,
Width of Entrance on Top - -	89	,,	Width of Entrance on Top - - -	66	,,	Width of Entrance on Top - -	99½	,,
,, ,, ,, ,, Bottom-	77	,,	,, ,, ,, ,, Bottom -	53	,,	,, ,, ,, ,, Bottom -	88½	,,
Water on Blocks at Spring Tide	26½	,,	Water on Blocks at Spring Tide -	24	,,	Water on Blocks at Spring Tide	34½	,,

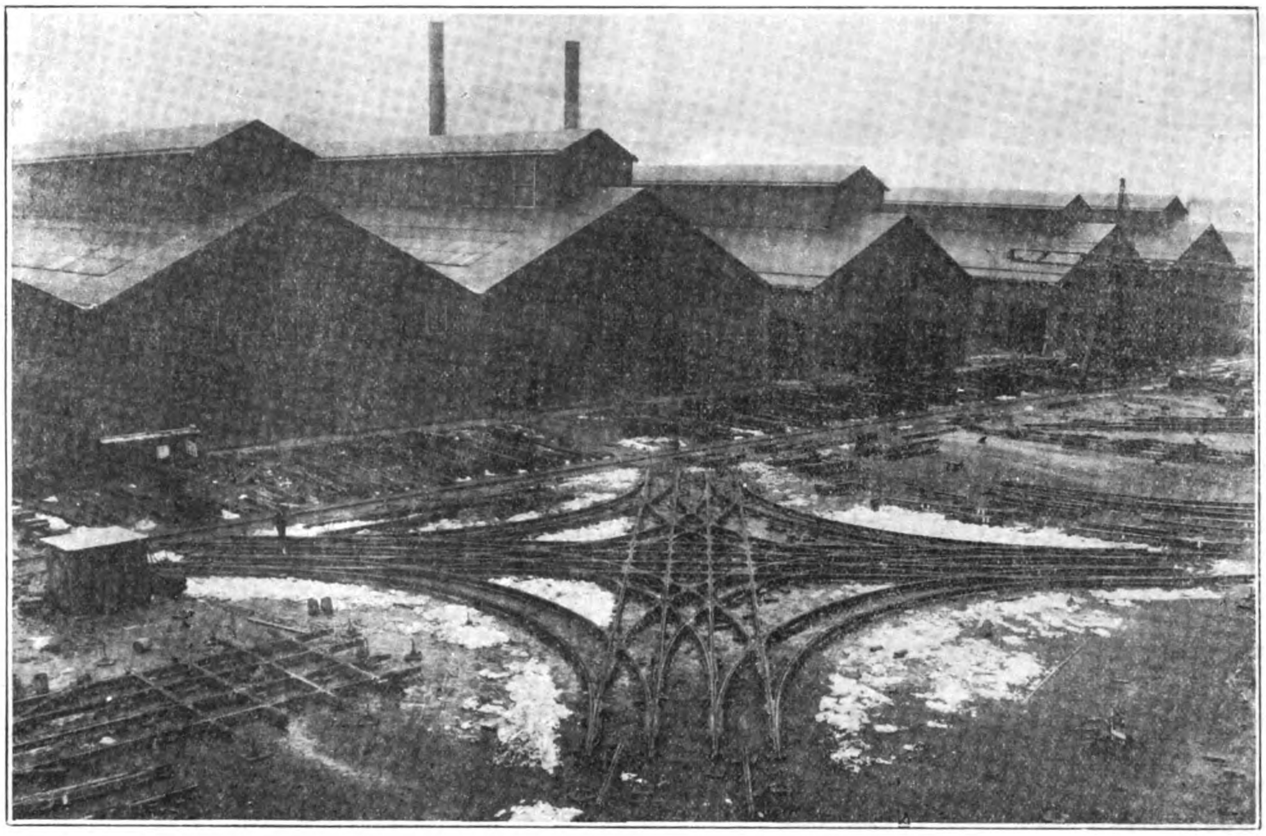
THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
Also Electrical Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND

LORAIN

Special Track Work



The Standard Tramway Construction Throughout the World

UNITED STATES STEEL PRODUCTS CO.

UNION BUILDING
THE BUND AND CANTON ROAD
SHANGHAI
CHINA

15 NAKADORI MARUNOUCHI
TOKYO, JAPAN

22 WU LIANG TA JEN HUTUNG
PEKING, CHINA

MITSUBISHI IRON AND STEEL CO., TD.

(MITSUBISHI SEITETSU KAISHA, LTD.)

HEAD OFFICE: MARUNOUCHI, TOKYO

CAPITAL: (PAID UP) YEN 30,000,000

MILL (LLOYD'S APPROVED) KENJIHO, CHOSEN (KOREA)

PRODUCTS PIG IRON—Basic & Foundry 100,000 tons.

STEEL—High Tensile & Mild Steel 50,000 tons.

BY-PRODUCTS—Sulphate of Ammonia; Pitch; Naphthalene; Tar Oil (light, middle, heavy); Slag-Cement, Slag Wool.

Sales Agents: **The Mitsubishi Trading Company, Limited**

BRANCHES AND AGENCIES: Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

MITSUBISHI MARINE & FIRE INSURANCE Co., Ltd.

MITSUBISHI KAIJO KASAI HOKEN K. KAISHA

Head Office:

MARUNOUCHI, TOKYO

SUBSCRIBED CAPITAL - - Yen 5,000.000

PAID-UP CAPITAL - - - „ 1,250.000

Branches and Agencies:

LONDON, NEW YORK, OSAKA, KOBE, SHANGHAI, AND OTHER IMPORTANT CITIES AND PORTS IN THE WORLD

MITSUBISHI WAREHOUSE CO., LD.

(MITSUBISHI SOKO KAISHA, LTD.)

LANDING, SHIPPING AND FORWARDING AGENTS, STEVEDORES, CUSTOMS BROKERS & WAREHOUSEMEN

Head Office: MARUNOUCHI, TOKYO

Branches: TOKYO, YOKOHAMA, KOBE, OSAKA AND MOJI

General Managers of the

KYODO UNYU KAISHA

YOKOHAMA

3 KAIGAN-DORI, ITCHOME

YOKOHAMA

WITH TWO BRANCHES IN TOKYO

BRILL TRAMCARS

The construction of electric tramcars and trucks for service all over the world has engaged the facilities of the Brill Organization for the past 48 years.

East, West, North and South Brill-built tramcars and trucks have gone to live up to that reputation for correctness of design and workmanship that is largely responsible for the development of the Brill business to a place of international importance.

THE J. G. BRILL COMPANY

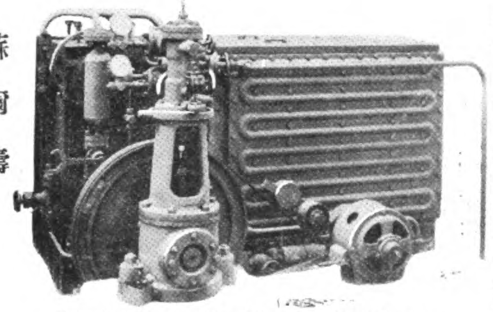
Philadelphia, Pa., U.S.A.

FAR EAST REPRESENTATIVES — ANDERSEN, MEYER & CO., LTD. SHANGHAI — PACIFIC COMMERCIAL CO. MANILA

SULZER BROTHERS

SHANGHAI ENGINEERING OFFICE
No. 4 AVE. EDWARD VII

蘇爾壽
工業事務所
上海愛多亞路四號



Complete Ice-making Plant for 220-lbs. to 1,320-lbs. per day of 9-12 working hours

目錄及關於工業上之問答等請直接本公司詢
須指明經何進口行以便公司與之接洽一切也

Uniflow Steam Engines, Upright Watertube Boilers, High and Lowlift Centrifugal Pumps, Fans and Ventilators for all purposes, Fire Engines, ICE AND REFRIGERATING PLANTS, Stationary Diesel Engines, Direct Reversible Diesel Marine Engines, Central Heating, Electro-Boilers, Maag Gear Machines.

WINTERTHUR. SWITZERLAND.

Through America

via

The Milwaukee Railway

(*The Puget Sound Electric Route*)

A short, quick, and most comfortable route across the American Continent over the

World's Longest Electrified Railroad

For 649 miles over four mountain ranges mighty electric locomotives, using "White Coal" for power haul the splendidly equipped all-steel transcontinental trains

"The Olympian" and *"The Columbian"*

from Seattle and Tacoma daily for Spokane, Butte, Minneapolis, St. Paul, Milwaukee and Chicago.

"The Pacific Limited"

from San Francisco to Chicago via Southern Pacific, Union Pacific and Milwaukee Railways.

At Chicago connections are made with fast express trains for the Atlantic Seaboard and all points east.

Rail orders and full information respecting train schedules, connections, fares, etc., on application to your steamship agent or at any office of Thos. Cook & Son in the Orient.

For sleeping car reservations, write, cable or wireless any of the following representatives of the

Chicago, Milwaukee & St. Paul Railway

Cable Address: "Milwaukee"

Seattle—J. F. Bahl, City Passenger Agent, 2nd and Madison
San Francisco—C. H. Miles, General Agent Passenger Dept., 995 Monadnock Bldg.
Vancouver—Geo. W. Hibbard, General Agent, 626 Hastings St., West
Victoria—F. O. Finn, General Agent, 902 Government St.
A. P. Chapman, Jr., Ass't Gen'l Passenger Agt., 663 Stuart Bldg., Seattle
Geo. B. Haynes, General Passenger Agent, Chicago

TOSHIN SOKO

KABUSHIKI KAISHA

WAREHOUSING, FORWARDING AND EXPRESS CO.

WAREHOUSEMEN LANDING AND SHIPPING

STEVEDORES CUSTOM BROKERS

WAREHOUSING AREA - - - - - - - - - 76,000 tsubo (308,000 Sq. yds.)
VALUE OF GOODS IN WAREHOUSE (latest date) - - - - Yen 95,000,000
CAPITAL (PAID UP) - Yen 5,000,000; RESERVE FUND - Yen 4,768,000

President: BARON TOSHITARO MITSUI
Managing Directors: H. OKUMURA and R. KADONO
Directors: K. HAYASHI and K. FUKUI
Auditors: E. KOSHI and T. MAJIMA

HEAD OFFICE: No. 5 HONKAWAYA-CHO, NIHONBASHI-KU, TOKYO

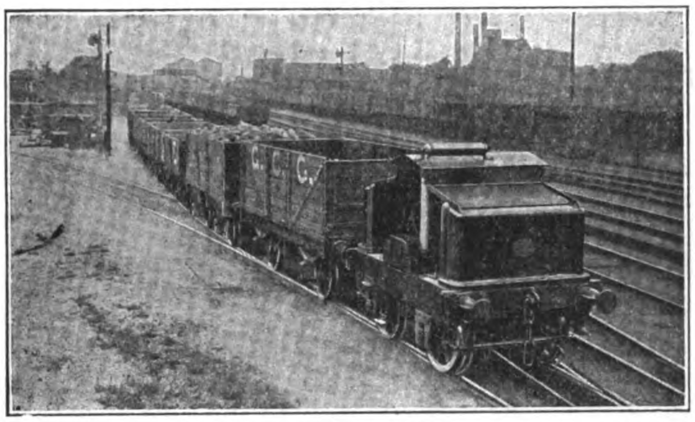
BRANCHES and SUB-BRANCHES:

TOKYO—Hakozaki-cho, Fukagawa-ku
OSAKA—Nakanoshima, Nishi, Utsubo, Aji-kawa, Nishinari, Sakurashima Chikuko
YOKOHAMA—Shinko-cho
NAGOYA
KOBE—Kano-cho
MOJI—Hama-cho
SHIMONOSEKI—Kannonzaki-cho

MOTOR RAIL & TRAM CAR CO., LTD.

LIGHT RAILWAY ENGINEERS

Manufacturers of Internal Combustion Engined Locomotives, Rail-Inspection and Tramcars



40 H.P. Loco Working on Main Line Siding

These vehicles are thoroughly reliable, economical, inexpensive to maintain, easily handled and entail no stand-by losses

All kinds of Light Railway Material supplied

ENQUIRIES SOLICITED

WORKS & OFFICES:
Telegrams & Cables: Motral-Bedford
Codes: A.B.C. Engineering 5th Ed & Bentleys

SIMPLEX WORKS:
Bedford, England

CIGARETTE MACHINERY

800 Cigarettes per Minute!

PLAIN OR TIPPED ON

Our New "Triumph-Model U.G." Cigarette Machine

The phenomenal speed of this machine, its supreme simplicity and its low cost of upkeep, are due to the revolutionary improvements in its design and construction—the outcome of 40 years of experience in the manufacture of cigarette machinery.

This machine is an indispensable part of the equipment of any modern up-to-date factory. Old modern machines are rapidly being replaced. The measure of your success depends on your cost of production.

Write for full particulars to-day on our—

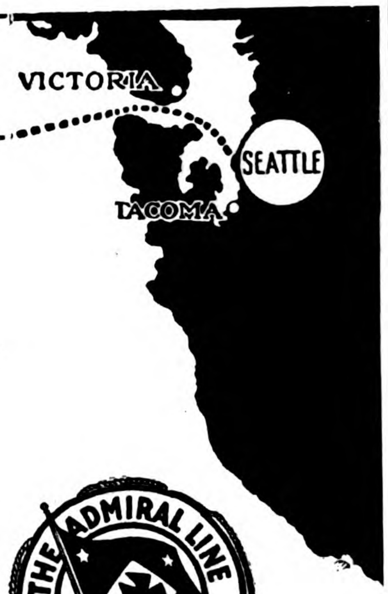
CIGARETTE MACHINES
TOBACCO STEMMING MACHINES
AUTOMATIC KNIFE GRINDERS
CIGARETTE PACKING MACHINES

UNITED CIGARETTE MACHINE CO., Inc.,
Lynchburg, Va., U.S.A.

Agents for China: AMERICAN TRADING CO.
Robert Dollar Building, SHANGHAI

SHANGHAI TO SEATTLE 16 DAYS

A New Fast American
TRANS-PACIFIC SERVICE
between MANILA-HONGKONG
SHANGHAI
KOBE-YOKOHAMA
and PUGET SOUND
VICTORIA, B.C.—SEATTLE, WASH.
VIA THE SHORT ROUTE



UNITED STATES SHIPPING BOARD 535's

		Leaving Shanghai	Arr. Seattle
President Madison	(X Bay State)	Nov. 19	Dec. 5
,, McKinley	(X Keystone State)	Dec. 3	Dec. 19
,, Jackson	(X Silver State)	Dec. 17	Jan. 2
,, Grant	(X Pine Tree State)	Dec. 31	Jan. 16
,, Jefferson	(X Wenatchee)	Jan. 14	Jan. 30

AGENTS

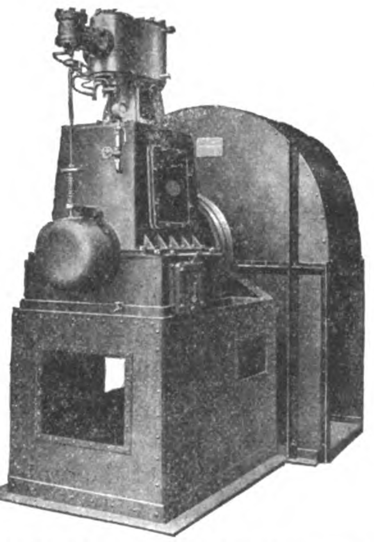
Manila: No. 24 Calle David, P.O. Box 1636
Hongkong: No. 2 Ice House Street.
Shanghai: No. 29-B Nanking Road, Amer. P.O. Box 503
Kobe: No. 7-A Kaigan-Dori. P.O.Box 308
Yokohama: No. 75-A Main Street, P.O. Box 326
Singapore: No. 2 Prince Street.

HEADQUARTERS FOR THE FAR EAST
No. 29-B Nanking Road, Shanghai.
Major GEO. A. HEYBURN, Acting Manager
GEO. J. McCARTHY, Assistant General Passenger Agent.

The ADMIRAL LINE

ANYWHERE ON THE PACIFIC

PACIFIC STEAMSHIP COMPANY



THE emission of black smoke has been a nuisance since the beginning of the industrial era. Various fuels and methods of control have been used from time to time in attempts to solve this problem. But little headway was made until the Cyclone system of Induced Draught was applied. It was found, at once, that not only did this installation prevent the emission of black smoke but that it made a great reduction in fuel costs.

It is doing this to-day. The Manufacturers who have adopted the Cyclone Plant are using a much cheaper fuel without the slightest decline in output or efficiency.

INDUCED DRAUGHT

by "Cyclone" Fans

MATTHEWS & YATES Ltd.

Cyclone Works, Swinton
Nr. Manchester, England

Write Now for Booklet
No. 391

DIAMOND

POWER SPECIALTY CORPORATION

Exclusive Manufacturers in the United States of

DIAMOND

SOOT BLOWERS

For all high-pressure steam boilers.

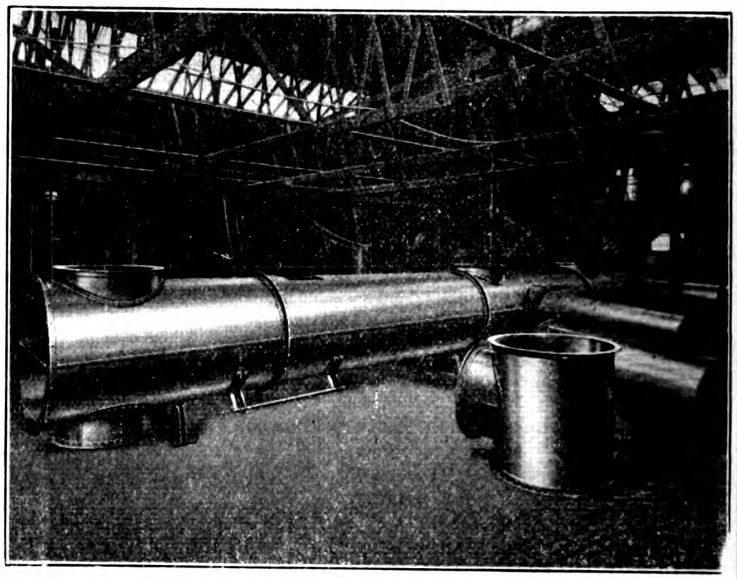
10340 Oakland Avenue,
DETROIT, MICHIGAN, U.S.A.

ARCHIBALD LOW & SONS, LTD.

MERKLAND WORKS

PARTICK, GLASGOW, SCOTLAND

Telegrams: "HIGHLOW GLASGOW" Code A. B. C.



Makers of:

Rivetted or Welded Steel Pipes, Storage Tanks for Fuel Oil, Water, etc.

Steel Pipes for Oil, Steam and Water with Flanges, Screwed, Expanded or Welded and Bends made to Drawings or Specification up to 14-in. diameter Funnels, Ventilators and all classes of Sheet Iron work. Seamless Coils for Heating and Refrigerating, etc.

Specialists in Oil Fuel Pipes and Pumping Installations

Coppersmith work of all description

Instantaneous and Storage Steam Calorifiers

STEAM AND HOTWATER Radiators

"Bonlow" Patent Automatic Tank Gauge

"Highlow" Electric Heating and Cooking Apparatus

Catalogues and quotations on request.

KOKUSAI KISEN KAISHA

Nominal Capital	- -	Yen 100,000,000.00
Paid-up Capital	- -	,, 87,500,000.00
Aggregate Tonnage	- -	500,000 Tons

FLEET OF STEAMSHIPS

Name	Tons D.W.	Name	Tons D.W.
Rozan-Maru	8,700	Seifuku-Maru	9,100
Vancouver-Maru	9,100	Suez-Maru	6,600
Boston-Maru	8,800	Daio-Maru	9,000
Tofuku-Maru	9,100	Kashu-Maru	8,800
Chifuku-Maru	9,100	No. 2 Kifunesan-Maru	5,000
Ryufuku-Maru	9,100	Yousan-Maru	5,000
Hankow-Maru	6,400	Taisan-Maru	5,000
Yoni-Maru	11,000	Yuri-Maru	11,000
Taibu-Maru	8,900	Texas-Maru	11,000
San Francisco-Maru	9,100	Tamatsu-Maru	6,600
Naple-Maru	9,100	Eifuku-Maru	9,100
Glasgow-Maru	9,100	Kifuku-Maru	9,100
Yayoi-Maru	8,700	Toyofuku-Maru	9,000
Yaye-Maru	11,000	Raifuku-Maru	9,100
Malta-Maru	8,700	Keifuku-Maru	9,100
Buyo-Maru	8,800	Washington-Maru	9,100
Brazil-Maru	9,100	Tokufuku-Maru	9,100
Kofuku-Maru	9,100	Portland-Maru	9,100
Yezari-Maru	6,900	England-Maru	9,100
Yugao-Maru	5,000	Chili-Maru	9,100
Yubaye-Maru	5,000	Argentine-Maru	9,100
Sydney-Maru	6,400	Port Said-Maru	9,100
Shanghai-Maru	6,400	New York-Maru	9,100
Singapore-Maru	9,100	Karorin-Maru	6,400
Jyufuku-Maru	9,100	Tasmania-Maru	6,400
Hiyeizan-Maru	6,700		

Head Office: No. 8 Kaigan-dori, Kobe

BRANCH OFFICE:

Tokyo Kaijo Building, Maruno-uchi, Tokyo, Japan

Amoy
Antung
Cantcn
Changsha
Chefoo
Chinkiang
Dairen (Dalny)
Foochow
Hankow
Harbin
Hongkong

BUTTERFIELD & SWIRE

(JOHN SWIRE & SONS, LTD.),
FRENCH BUND, SHANGHAI
Telephone No. Central 4881
AGENTS FOR

Ichang
Kiukiang
Kobe
Nanking
Newchwang
Ningpo
Shanghai
Swatow
Tientsin
Tsingtau
Wuhu
Yokohama

The Blue Funnel Line

(Ocean S.S. Co., Ltd. & China Mutual S. N. Co., Ltd.)

Fast Services

Japan, China, Hongkong, Philippines, Straits and Java to Europe via Suez Canal and to New York via Suez and Panama Canals also

Trans-Pacific between Oriental ports and West Coast of N. America.

CHINA NAVIGATION CO., LTD.

Passenger and Freight Steamship Services

SHANGHAI TO, AND FROM,

Weihaiwei, Chefoo and Tientsin (for Peking); Newchwang: Antung.

Hankow, Ichang (with connection to Chungking), Changsha, and Intermediate Yangtsze Ports.

Hongkong and Canton; Amoy and Swatow; Ningpo; and General Coasting Services.

HONGKONG TO, AND FROM,

Manila, Cebu, and Iloilo

Weihaiwei, Chefoo and Tientsin (for Peking)

Canton; Hoihow, Pakhoi and Haiphong; Bangkok and Singapore.

Shanghai and Yangtze Ports (as above)

Sydney, Melbourne and Australian Ports (Australian-Orie tal Line)

Taikoo Sugar Refining Co., Ltd.

F I N E S T C A N E S U G A R S

Taikoo Dockyard & Engineering Company of Hongkong Ltd.

Ship Builders, Ship Repairers, Engine Builders, Boiler Makers, etc.

Fire and Marine Insurance

Fire

London and Lancashire Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

Guardian Assurance Co., Ltd.

Orient Insurance Company.

British Traders Insurance Co., Ltd.

Marine

British and Foreign Marine Insurance Co., Ltd.

Standard Marine Insurance Co., Ltd

Royal Exchange Assurance Corporation.

Sea Insurance Co., Ltd.

Guardian Assurance Co., Ltd.

From San Francisco to Japan, China, Philippines and the Far East

CALLING AT HONOLULU, YOKOHAMA, KOBE, NAGASAKI, SHANGHAI, MANILA HONGKONG

NORTH AMERICAN LINE

S.S. "Shinyo Maru"—"Tenyo Maru"
22,000 Tons, Triple Screw Turbine—21 Knots

S.S. "Korea Maru"—"Siberia Maru"
20,000 Tons, Twin Screw Turbine—18 Knots

S.S. "Persia Maru,"
9,000 Tons

PERFECT SERVICE—UNEQUALLED CUISINE

Sailings from San Francisco

S.S. "SHINYO MARU"	sails for Orient	Dec. 7, 1922
S.S. "TAIYO MARU"	" " "	Jan. 3, 1923
S.S. "SIBERIA MARU"	" " "	Jan. 16, 1923
S.S. "TENYO MARU"	" " "	Jan. 25, 1923

Sailings from Shanghai

S.S. "TAIYO MARU"	sails for San F'cisco	Nov. 30, 1922
S.S. "SIBERIA MARU"	" " " "	Dec. 11, 1922
S.S. "TENYO MARU"	" " " "	Dec. 22, 1922
S.S. "KOREA MARU"	" " " "	Jan. 8, 1923

SOUTH AMERICAN LINE

The only Regular Direct Service between the Orient (Hongkong, Mogi, Kobe, Yokohama), Hawaii (Honolulu), San Francisco, San Pedro (Los Angeles), Mexico (Salina Cruz), Panama (Balboa), and South America (Callao, Arica, Iquique, Valparaiso)

S.S. "ANYO MARU," 18,500 Tons S.S. "KIYO MARU," 17,200 Tons S.S. "SEIYO MARU," 14,400 Tons
and three additional steamers for monthly services

HEAD OFFICE: TOKYO, JAPAN

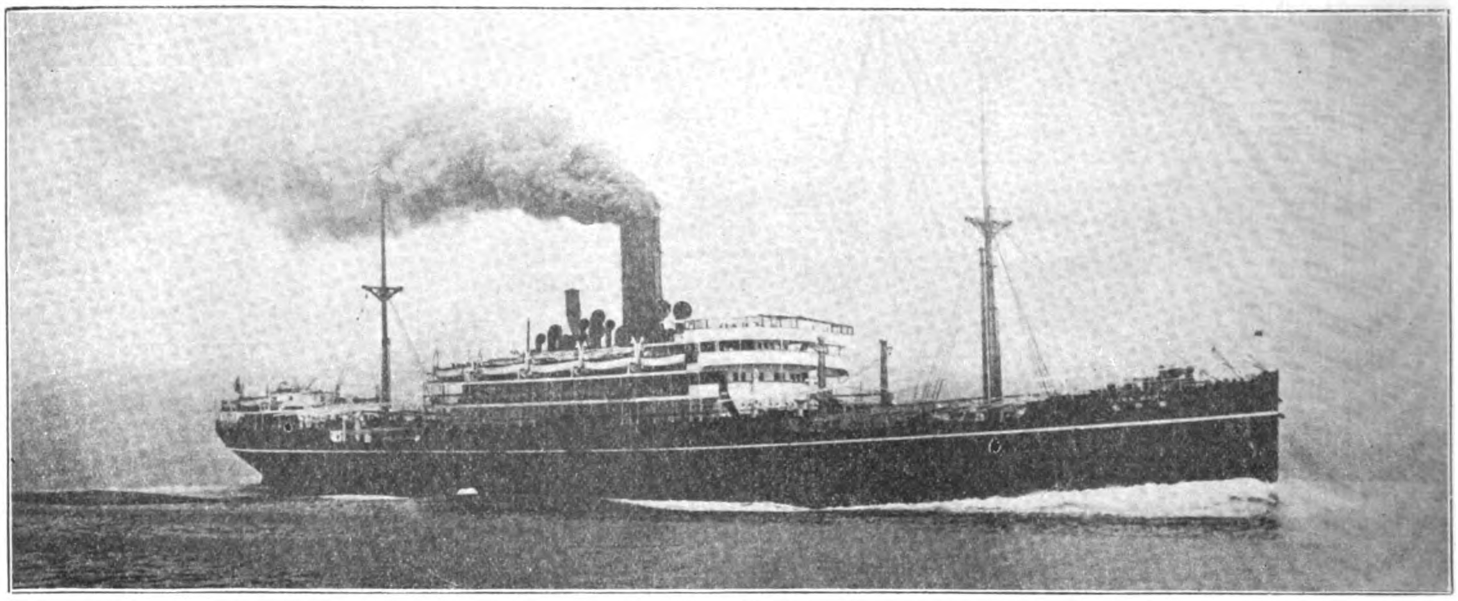
GENERAL OFFICE, YOKOHAMA, 5 YAMASHITA-CHO

Branches: **San Francisco: 625 Market St.; Chicago: 58 East Washington St.; New York City: 165 Broadway; Kobe: 83 Kyo-Machi; Shanghai: 71 Szechuen Road; Hongkong: King's Building; Manila: Chaco Building**

Agency: **Nagasaki: Holme, Ringer & Co.**

NIPPON YUSEN KAISHA

HEAD OFFICE TOKYO, JAPAN



"SUWA MARU"

OVER THE

THE PALATIAL STEAMERS OF THE N.Y.K.

WILL CARRY YOU IN COMFORT, CLEANLINESS AND WITH COURTESY

PRINCIPAL SERVICES

EUROPEAN LINE (Fortnightly)

WEST COAST LINE (Monthly).
GLASGOW, BIRKENHEAD, AND SWANSEA (occasionally).
SINGAPORE, HONGKONG, SHANGHAI AND JAPAN.

NORTH CONTINENTAL LINE (Monthly).
HAMBURG, GRANGEMOUTH, ROTTERDAM AND ANTWERP.
STRAITS, JAVA, CHINA AND JAPAN.

NORTH AMERICAN LINE (Every 3 Weeks).
HONGKONG, MANILA, SHANGHAI, KOBE AND YOKOHAMA.
VICTORIA, B.C., AND SEATTLE.

SOUTH AMERICAN LINE (Every 2 Months)
KOBE, SINGAPORE, DURBAN AND CAPETOWN.
SANTOS, RIO DE JANEIRO AND BUENOS AIRES.

AUSTRALIAN LINE (Monthly).
YOKOHAMA, KOBE, HONGKONG, MANILA, ZAMBOANGA, THURSDAY ISLAND, TOWNSVILLE, BRISBANE, SYDNEY AND MELBOURNE.

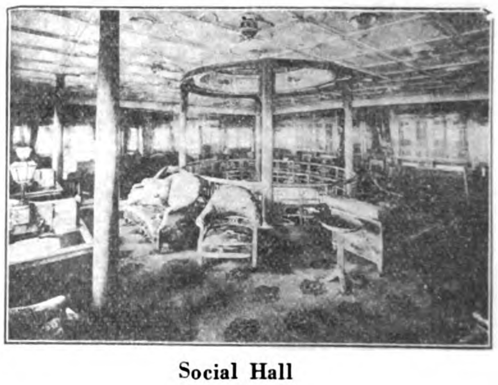
BOMBAY LINE (Fortnightly).
KOBE, SHANGHAI, HONGKONG, SINGAPORE, MALACCA, COLOMBO, TUTICORIN AND BOMBAY.

CALCUTTA LINE
(FORTNIGHTLY) YOKOHAMA, KOBE, HONGKONG, SINGAPORE PENANG, RANGOON AND CALCUTTA.
(MONTHLY) CALCUTTA, MADRAS, COLOMBO, SUEZ, PORT SAID, ALGIERS AND NEW YORK.

NEW YORK-FAR EAST LINE (Fortnightly)
KOBE, YOKOHAMA, SAN FRANCISCO, PANAMA, COLON, HAVANA AND NEW YORK.
NEW YORK TO JAPAN, CHINA AND PHILIPPINES.

Smoking Room

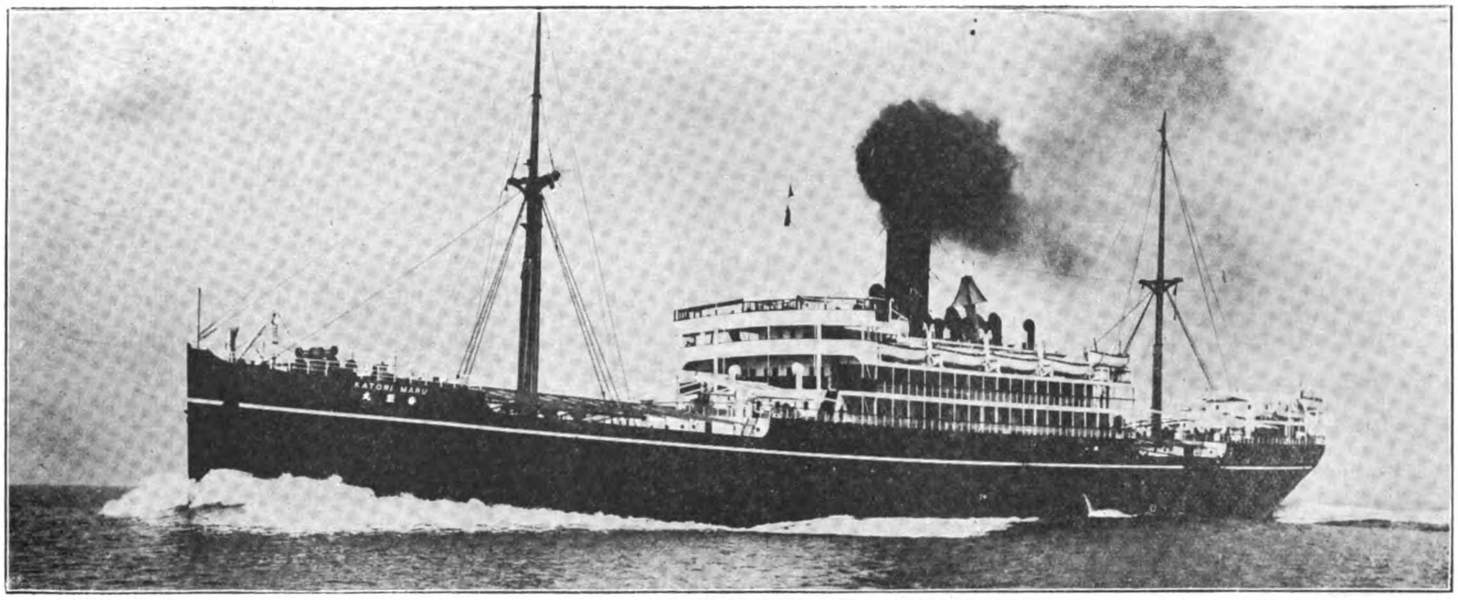
Dining Saloon



Social Hall

NIPPON YUSEN KAISHA

FLEET: 114 STEAMERS, 574,594 GROSS TONS



"KATORI MARU"

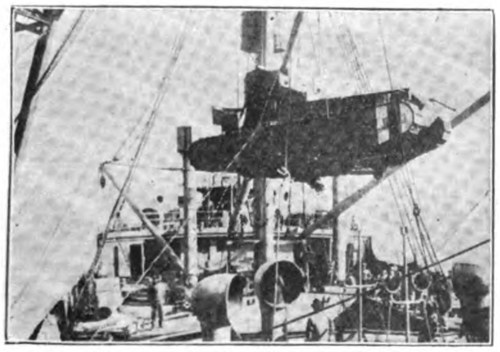
SEVEN SEAS

SHIPPERS WILL FIND QUICK DISPATCH, WITH WHARF, WAREHOUSE AND TERMINAL FACILITIES AT ALL PRINCIPAL PORTS SERVED BY N.Y.K. STEAMERS

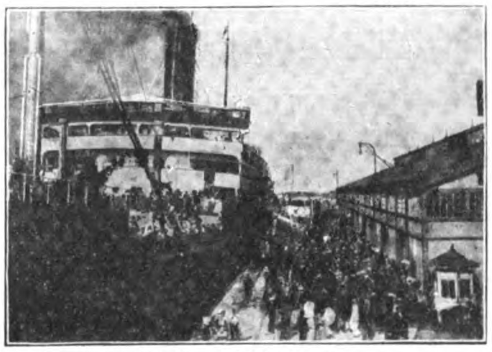
PRINCIPAL BRANCHES AND AGENCIES

Yokohama	Tokio	Nagoya	Keelung
Kobe	Moji	Nagasaki	Hankow
Hakodate	Otaru	Tientsin	Singapore
Tsingtao	Hongkong	Canton	Bombay
Penang	Colombo	Calcutta	Liverpool
Port Said	Marseilles	London	Chicago
Antwerp	Rotterdam	New York	Brisbane
Seattle	Manila	Townsville	Shanghai
Sydney	Melbourne	Osaka	

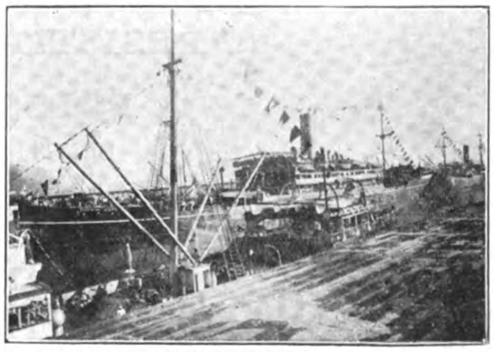
GIVE JAPANESE STEAMSHIPS THEIR SHARE OF YOUR JAPANESE CARRYING TRADE



Landing a Tank



Dock at Yokohama



Great Northern Dock at Seattle

Chartered Bank of India, Australia and China

INCORPORATED BY ROYAL CHARTER, 1853

Capital £3,000,000
Reserve Fund £3,700,000
Reserve Liabilities of Shareholders . £3,000,000

Head Office: 38 BISHOPSGATE, LONDON, E.C.
Shanghai Branch: 18 THE BUND.

Court of Directors:

SIR MONTAGU CORNISH TURNER, *Chairman.*
SIR DUNCAN CARMICHAEL
THOMAS CUTBERTSON, Esq.
SIR ALFRED DENT, K.C.M.G.
SIR WILLIAM HENRY NEVILLE GOSCHEN, K.B.E.
THE RIGHT HON. LORD GEORGE HAMILTON, G.C.S.I.
SIR JOHN NEWALL JORDAN, P.C., G.C.I.E., K.C.B., K.C.M.G
WILLIAM FOOT MITCHELL, Esq.
JAMES MAXWELL GRANT PROPHIT, Esq.
LEWIS ALEXANDER WALLACE, Esq.

Chief Manager: W. E. PRESTON
Managers: J. S. BRUCE & G. MILLER

Bankers:

THE BANK OF ENGLAND.
THE LONDON JOINT CITY & MIDLAND BANK, LTD.
THE LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.
THE NATIONAL PROVINCIAL & UNION BANK OF ENGLAND, LTD.
THE NATIONAL BANK OF SCOTLAND, LTD.

Agencies and Branches:

Alor Star (Kedah), Amritsar, Bangkok, Batavia, Bombay, Calcutta, Canton, Cawnpore, Cebu, Colombo, Delhi, Haiphong, Hankow, Hongkong, Iloilo, Ipoh, Karachi, Klang, Kobe, Kuala-Lumpur (F.M.S.), Madras, Manila, Medan, New York, Peking, Penang, Puket, Rangoon, Saigon, Seremban, Shanghai, Singapore, Sourabaya, Taiping (F.M.S.), Tavoy, L. Burma, Tientsin, Yokohama

Drafts granted on the above Agencies and also on the principal Commercial Cities throughout the world. Bills of Exchange bought and received for collection. Travellers' Letters of Credit issued and every description of Banking and Exchange business undertaken.

C. J. SCOTT,
Manager.

ATTWATER & SONS

CANADIAN AND INDIAN MICA—

CUT, SLAB, and SPLITTINGS (Minimum Stock 200,000 lbs.) DYNAMO TAPES, ASBESTOS TAPES, and HOLLOW BRAIDS. EMPIRE CLOTH and LINO TAPES. PURE COTTON DUCKS and DRILLS. ARMATURE BINDING CORDS and ROPES VULCANISED FIBRE EBONITE, SHEET, RODS and TUBES.

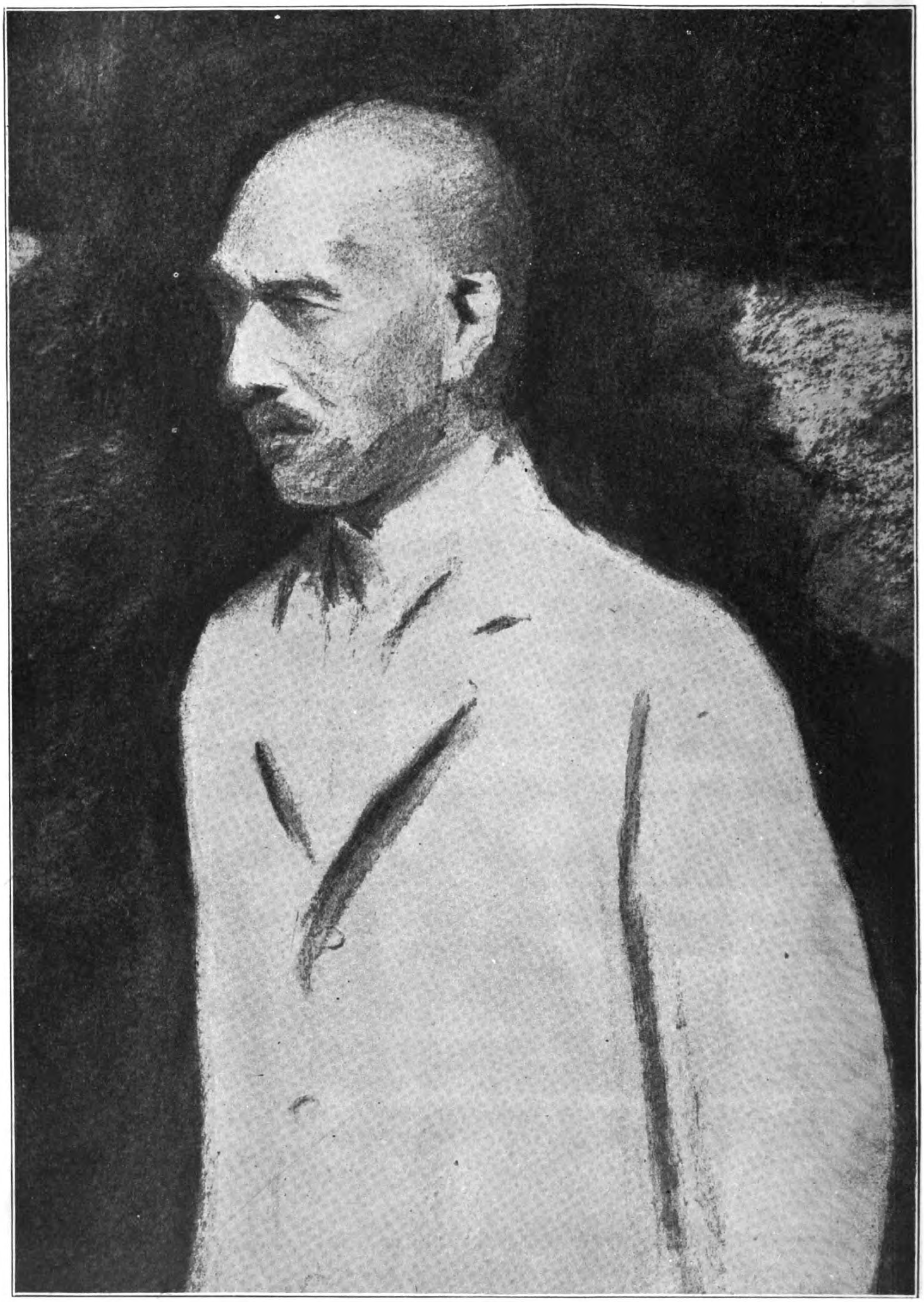
PEERLESS LEATHEROID INSULATION
THE GREATEST INSULATING PAPER MADE

"RESISTIT" (SYN. BAKELITE) PAPER, SHEET, & TUBE

PRESSPAHN AND INSULATING PAPERS
ELECTRICAL PURE RUBBER AND ADHESIVE TAPE

Contractors to the Admiralties and War Office, British, American, French and Italian Governments

Hopwood Street Mills, PRESTON, Eng. ESTABLISHED 1868
Telegrams: "Attwaters, Preston" *Telephone No.:* 1045 (2 lines) *Codes:* 5th Edition A.B.C., and Western Union



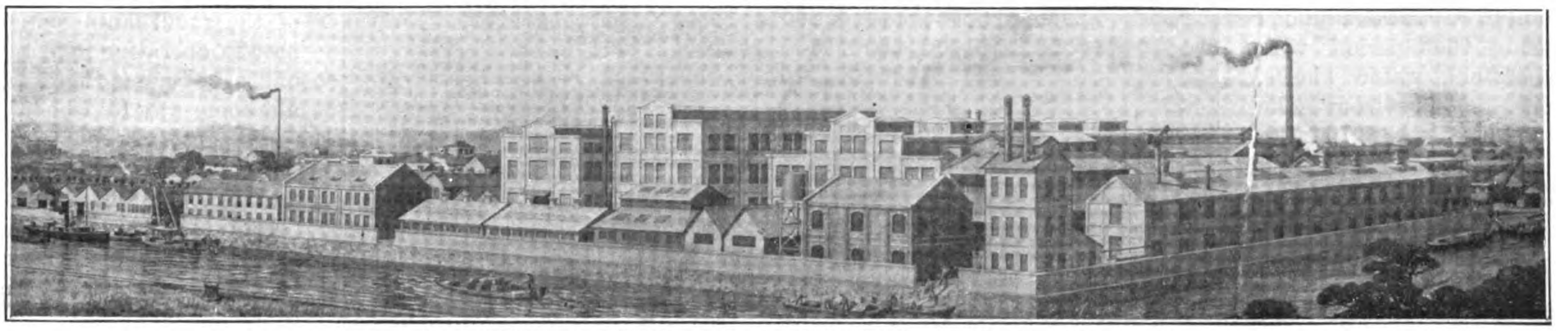
TOROKICHI OBATA

After a most strenuous term as Japan's minister to China, Mr. Torokichi Obata is to be transferred to another post. Probably no contemporary diplomat has had to face such difficult and intricate problems as has fell to the lot of Mr. Obata in his four years of service at Peking. His efforts to bring about a better understanding between China and Japan were often thwarted by the military leaders of his own government, the opposition of public opinion in China, and the intrigue of other powers.

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVIII SHANGHAI, NOVEMBER, 1922 No. 11



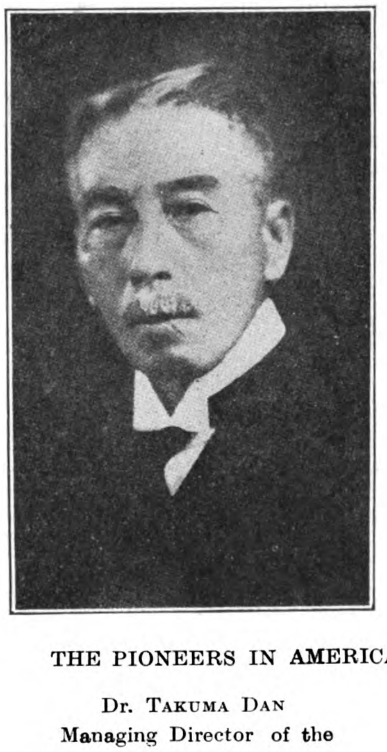
General View of the Shibaura Engineering Works, at Shibaura, Tokyo

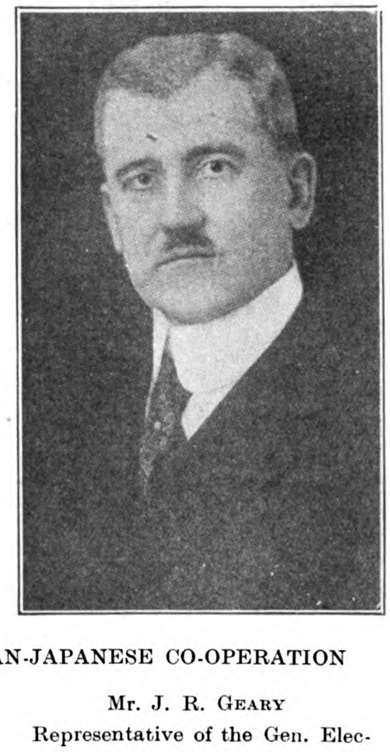
Linked with America in Big Industry

Success of the Shibaura Engineering Works

JAPAN is leading the world to-day in the expansion of her electrical industries, developing her water powers, electrifying her mills and machine shops and bringing the rural districts into close communication with the towns by means of electric tramways. At the end of 1920 there were 831 hydro-electric companies holding licenses from the government to develop 7,404,000 kilowatts but actually producing 1,254,000 kilowatts. Enterprises not yet in operation were licensed to develop another 2,756,000 kilowatts, and licenses applied for, to develop 3,394,000 kilowatts. Many of these companies have since been merged into larger combinations and many new plants completed and brought into operation. As a consequence of this development, the demand for electrical machinery and supplies has advanced by leaps and bounds and although a fair percentage of the orders have been placed with foreign manufacturers, by far the greater part of the equipment has been manufactured at home. There are now fifteen or more large works in Japan constructing dynamos of over 1,000 k.w., the largest being the Shibaura, the Hidachi, the Mitsubishi and the Okamura companies.

Of these the Shibaura Engineering Works are undoubtedly the largest builders of electrical machinery. The history of this company dates back to 1875, when Mr. Hisashige Tanaka, a well-known organizer of that time, started a machine shop at Shibaura in Tokyo, under the name of the Tanaka Works. The enterprise was on a very small scale, but such as it was, it attained a high reputation for the excellence of its work. The shops were developed year by year to keep pace with the increasing demand for machinery, until in 1893 they came into possession of the Mitsui family, who changed the name to the Shibaura Engineering Works and placed them under the direct management of Mr. Raita Fujiyama, at that time attached to the industrial department of the Mitsui family. This great organization backed the new enterprise in every way and by dint of constant and painstaking efforts built up the works to its present enviable position in the engineering world.





THE PIONEERS IN AMERICAN-JAPANESE CO-OPERATION

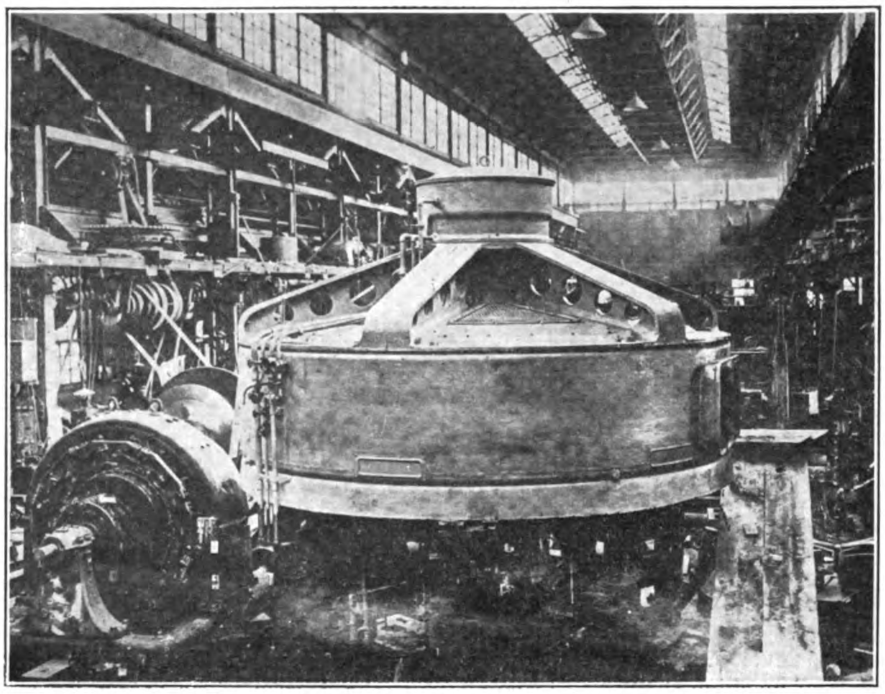
Dr. TAKUMA DAN
Managing Director of the Great Mitsui Interests and Director of the Shibaura Engineering Works.

Mr. J. R. GEARY
Representative of the Gen. Electric Co. in Japan, President of the Tokyo Electric Co. and Director of the Shibaura Eng. Works.

Mr. Fujiyama was succeeded in 1896 by Mr. Tomojiro Ono, and the latter by Mr. Genkichi Wakayama. The works were then operated as a department of the Mitsui mining department. He was followed by Mr. Nishimatsu and Mr. Otaguro. The Russo-Japanese war gave a strong stimulus to the works, which all this time specialized in the manufacture of electric generators, motors and transformers, in which the company's experts made steady and commenadable progress. The period between 1900-1901 was the beginning of an experimental stage during which

the company launched out into the manufacture of large units building a 200 horse-power motor and extending these experiments by making larger generators, transformers and other appliances. Emboldened by these successes, the works were reorganized in 1904 into a limited liability company with a capital of Y.1,000,000 with the members of the Mitsui family as shareholders.

Under the new control, many improvements were made and an up-to-date factory erected in 1908. During this period the engineers of the company were unusually active in designing and inventing new machines and appliances and in developing the home market for their specialities. Nearly every large engineering plant in Japan was supplied during that period with generators, water wheels, and boilers from the Shibaura Works. In 1910, the Shibaura Engineering Works made the step which brought it at once into prominence as the most advanced electrical concern in Japan and initiated that close co-operation with Americans which has since been the model for other American-Japanese combinations. In this year, an arrangement was entered into with the General Electric Company of America for the use of their patents in Japan on a co-operative basis, in which the American company was allotted one-third of the stock of the Japanese company. This agreement has brought most satisfactory results to both parties, and expanded the business in Japan to a point where the number of employees was increased from a few hundred to over 4,500 at the present time, and the size of generators has increased until now the works are turning out 7 to 8,000 kilowatt machines and larger, with a corresponding increase in motors transformers, and other accessories.



Shibaura Engineering Works: The Electric Rotary Machine Shop

This achievement was largely due not only to the foresight and business instinct of the Mitsui family, but to the activities and enterprise of Mr. J. P. Geary, the representative in Japan of the General Electric Company. This gentleman has always been a firm believer in the business capacity of the Japanese, holding that they can attain as high a standard of industrial production as any people in the world. In this he has been fully justified, not only by his own experience with the Tokyo Electric and Shibaura Engineering Works but in other well-known instances, where the Japanese have demonstrated that they are capable of being educated to the highest plane of engineering science and manufacturing ability.

Shibaura Engineering Works: The Foundry

In inviting attention to the possibilities of co-operation between Americans and Japanese, Mr. Geary cites his own experience as a guide to what may be accomplished along other lines. Interviewed on this subject he recently said:

"When I came to Japan in 1903 I became acquainted with the late Dr. Fujioka, who may be called the father of electricity in Japan, since he was instrumental in bringing to Japan from the United States some years before the first electrical apparatus used in this country. The doctor explained to me the details of the small lamp factory he was operating in Tokyo and asked me if there was not some way by which he could get manufacturing and financial assistance and technical information regarding the manufacture of lamps from the General Electric Company in America.

"After some negotiation I succeeded in getting the president of the company, in 1905 to permit me to make a cash investment of 100,000 yen in that small company, whose capital was then 200,000 yen. This was increased to 400,000 yen on our taking an interest in it. The number of employes at that time was about 100; the capital is now 10,000,000 yen and the number of employes 3,500.

"That is the net result of American-Japanese partnership in the lamp manufacturing business in Japan. The growth of the Tokio Lamp Company followed the tremendous increase in the electric lighting business from year to year, because they were able to supply lamps of home manufacture which quickly replaced the previously imported article. The changes in the methods of manufacture and in the lamp itself have been very marked during these years, and it was therefore necessary for the Japanese lamp factory and the Japanese lamp engineers to keep in close touch with progress in America.

"To accomplish this a number of the Japanese engineers of the Kawasaki factory have been and are now spending several months each year in the lamp factories of the General Electric Company in the United States. In addition to this, a small laboratory was started at the Kawasaki plant so that the Japanese engineers themselves could take up original research work. This has grown to be a

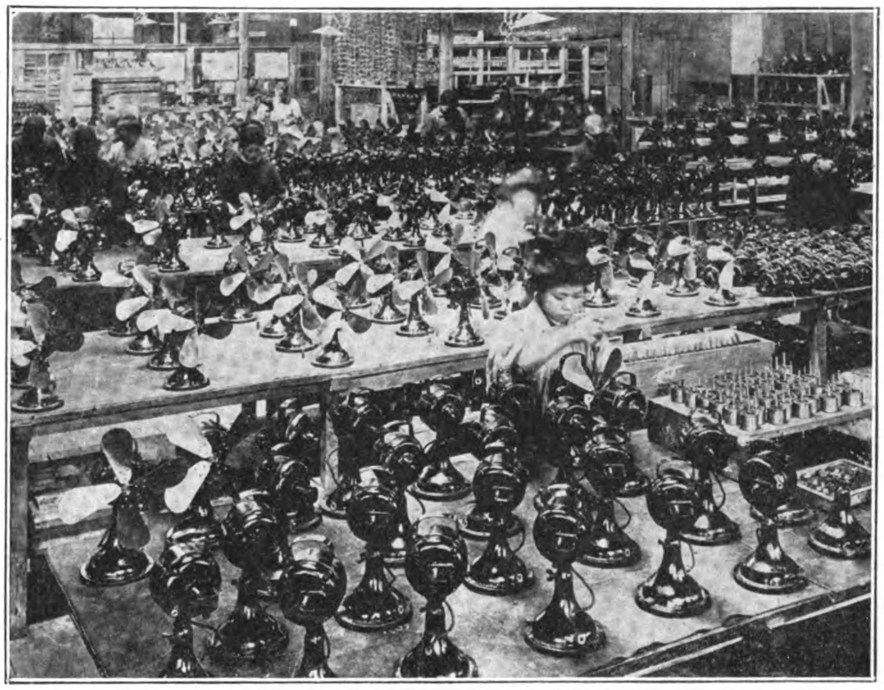
important department of the business and the investigations conducted by these Japanese engineers have been favorably commented upon by the engineers of the Japanese imperial army and navy, by the doctors of science and professors of the Tokio Imperial University, as well as by E. W. Rice, Jr., the present president of the General Electric Company, who is also an engineer and scientist of distinction.

" The Tokyo company has from time to time during the last few years made co-operative arrangements with small lamp manufacturing companies, granting them licenses to manufacture and sell under the patents of the General Electric Company which are owned in Japan. These arrangements have proved highly beneficial, satisfactory and profitable to the smaller companies and have helped to develop the business of electric lighting in Japan.

" The welfare of the employes and operatives of the Tokyo company has from the first been a matter of concern to its management. Fair wages have been paid and in addition to these a bonus has been distributed at the end of each term, based upon the profits earned and the record for good work borne by individual employes. A system has been established of service debentures with guaranteed interest returns for the benefit of deserving employes of long service in the company.

" Continuous welfare work has been conducted at the expense of the company for the conservation of the health of their employes, for the improvement of their living conditions and for assistance in case of illness or death. Provision has been made for rest rooms and club rooms at the works, and hospital attendance has been available at all times. More than this, the company has felt impelled to extend assistance to its employes in the purchase of food and clothing and in the matter of housing so as partly to offset the prevailing high cost of living.

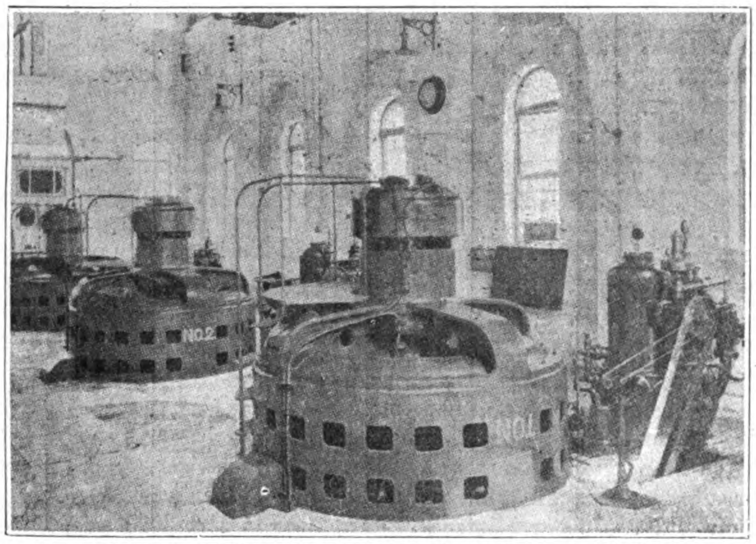
" The proof that all this has been a remunerative investment is to be found in the fact that the Tokyo company has been able to maintain a reasonable rate of dividend for the past ten years and also to sell its product at a lower price than incandescent lamps can be purchased in any other country in the world. Be it remembered that the entire staff of the company is Japanese, from the office boy to the president.



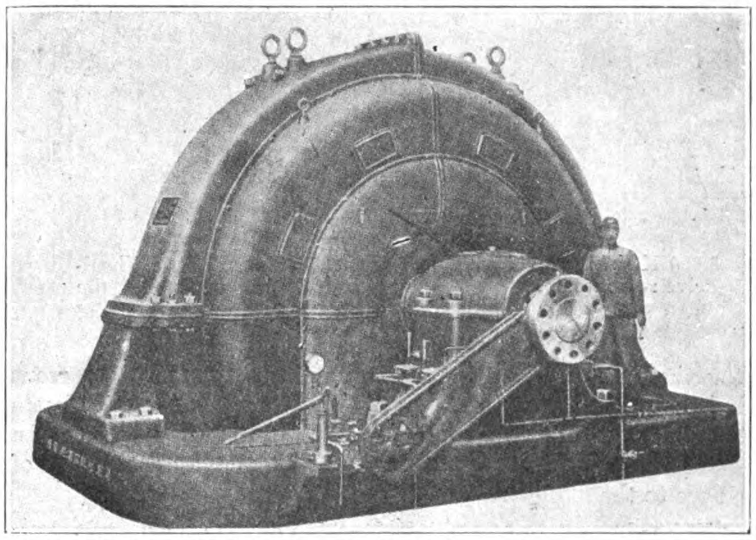
The Electric Heating Appliance and Fan Motor Shop of the Shibaura Engineering Works

" In the Shibaura Engineering Works there has been a similar example of co-operative management with equally satisfactory results. Here there were but a few hundred employes fifteen years ago, while now the maximum is about 4,500, and generators of 7,000 to 8,000 kilowatts can be manufactured. Practically the same arrangements have been made as in the case of the lamp concern with the General Electric Company. That is to say, the new improvements, the patent rights and manufacturing details and methods automatically pass from one company to other. The Shibaura engineers have free access to all departments of the apparatus factories of the General Electric Company in America, and a number of them are constantly stationed there for the actual investigation and study of our processes.

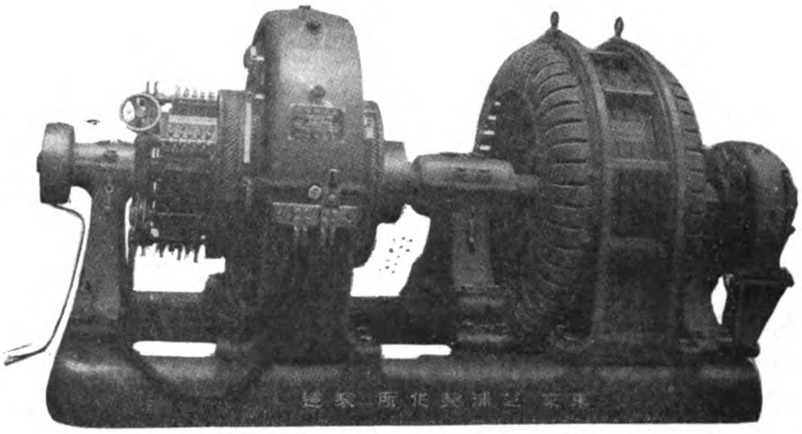
" The electrical business has grown to be a very large and very important industry in Japan, the capital invested is over 2,000,000,000 yen, and the kilowatts generated are at present over 1,000,000. There is still over 1,500,000 horse-power which may be generated by unused water power. The capacity now under way to be generated by both steam and water power must aggregate at least 400,000 kilowatts. These new plants will probably be completed



Three 1,875 K.V.A. 11,500 Volt 500 R.P.M. 50 Cycle Vertical Shaft Generators built by the Shibaura Engineering Works for the Wakayama Hydro-Electric Co.



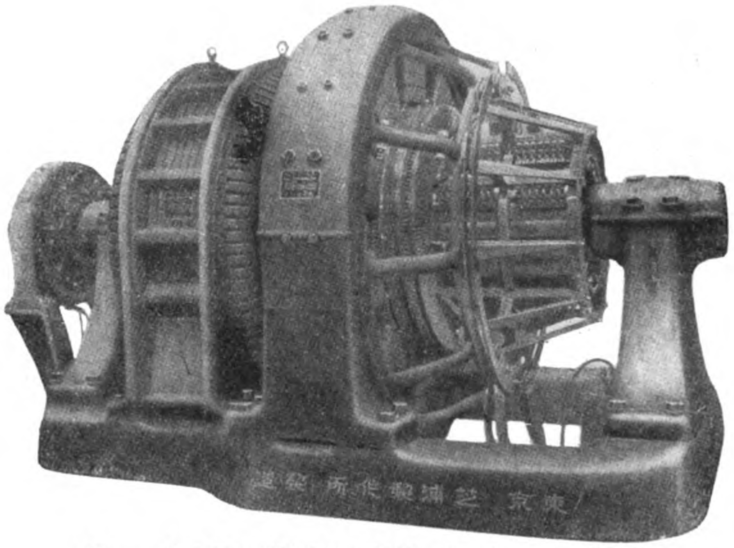
6,666 K.V.A. 6,600 Volt 375 R.P.M. 50 Cycle Generator, Enclosed-Ventilated for the Inawasiro Suiryoku Denki Kaisha built by the Shibaura Engineering Works



Type of 450 H.P. 300 K.W. Synchronous Motor Generating Set

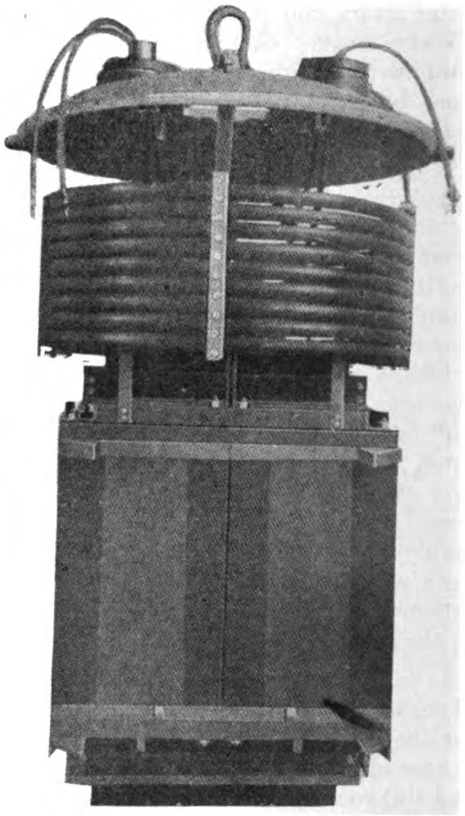
more intimate acquaintance between the people of the two countries, it is well to remember that these can be most readily attained by personal contact, business partnership and mutual financial interest. As I have said, the partnership between Americans and Japanese in the electrical business is no mere experiment; it has been attended with unvarying success for the fifteen years of its existence and with marked financial benefit to both parties.

"The possibilities of the future development of this form of American-Japanese co-operation are very great indeed. This statement applies not only to Japan, but to Siberia, Manchuria, Mongolia, Korea, China and even to countries further south. None of these are manufacturing countries, and it is my fixed opinion that Japan, with its manufacturing experience, is destined to be foremost in the electrical development of all this vast section of Asia. In Manchuria, the electrification of the properties of the South Manchurian Railway has been effected on a tremendous scale, while over 30,000,000 yen have, in addition, been invested in various plants in China during the last few years.

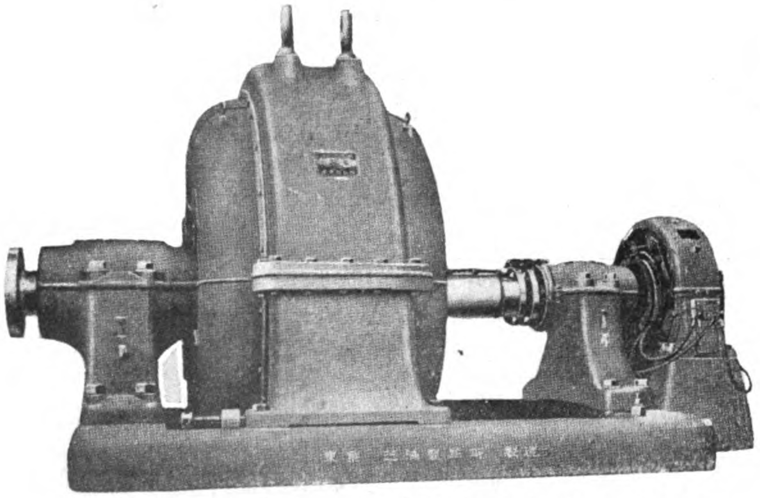


Type of 1,500 H.P. 1,000 K.W. Synchronous Motor Generating Set: 500 R.P.M: 6,000 Volts Motor: Generator 250 v. 4,000 amp

2,000 K.V.A. 66,000 v. water cooled transformer



Interior of 500 K.V.A. 3,300 v. water cooled transformer



3,000 K.V.A. 7,000 Volts, 600 R.P.M. 50 Cycle Water Wheel-driven Generator, enclosed ventilated type, built for the Tokyo Electric Company

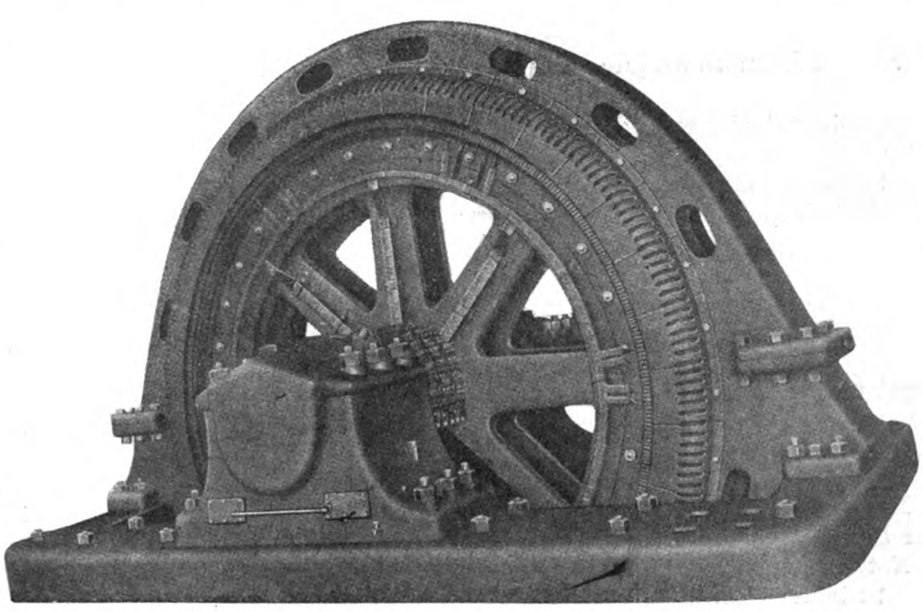
during the next three or four years, and the number of persons already employed in all branches of the electric industry in Japan is over 30,000. That, you must admit, bespeaks the existence of a fairly respectable degree of capacity from the lowest grade of employee to the highest.

"It has been found that the education of the electrical workers in the shops reaches a higher standard than in most other industries because of the qualities which the work demands. Now, it seems to me that in discussing the possibility of a better understanding and

"From our point of view, the sum of the whole matter is that in the near future the expansion of the electrical business in Japan in the nearby countries will be enormous, that it will require a great amount of capital and that its development is very likely to be along the lines of the co-operative system that has been established and made workable between Japanese and Americans in manufacturing companies here. In other words, the experience of the past affords the best possible guarantee that future partnerships on even a much larger scale can be formed and successfully maintained."

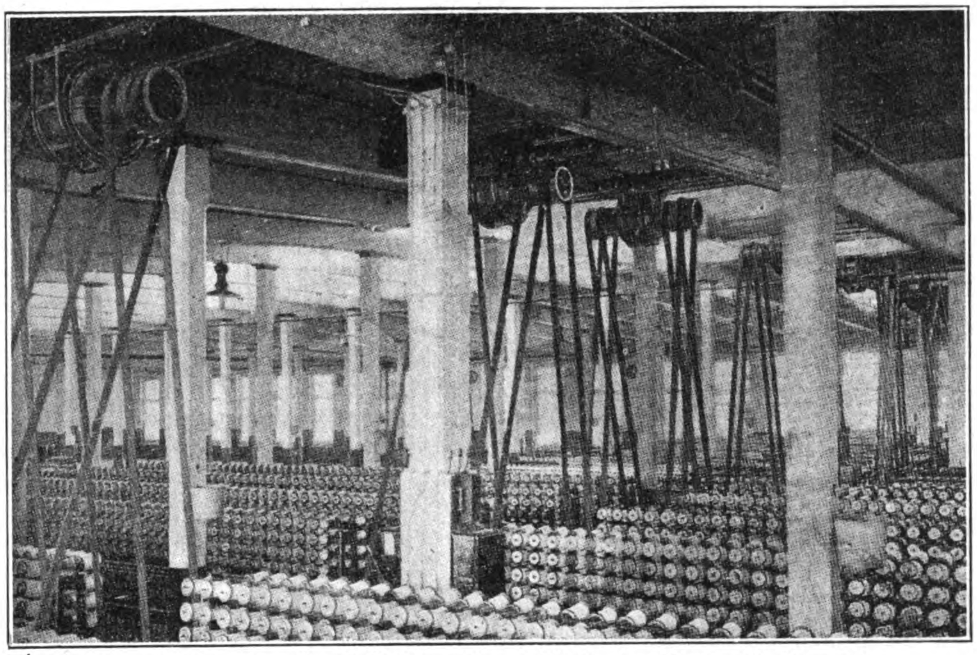
Under such close and harmonious co-operation, the business of the Shibaura Engineering Works has increased to a point where it is now filling more than seventy per cent. of the demand in Japan for electrical machinery and has extended its markets to China, Siam and the other Eastern Asiatic countries and islands. The decisive step taken in 1911 to confine itself to the development of electrical machinery and appliances was the turning point in its career of prosperity. At that time, due to its limited plant and

the slow growth of electrical undertakings in Japan and the preference for imported machinery, the company's scope of activities was somewhat curtailed, but since the date of its entering into a co-operative agreement with the largest American electrical machinery manufacturer, its growth has been rapid and assured. In quality and operating efficiency, their products took a foremost place in the electrical world and when the European war broke and the importations from other countries were cut off, the works experienced a remarkable advance, necessitating greater activities in order to meet the enormous demand of the home market. At this time, the Shibaura Works not only filled the requirements of the Japanese market but exported many of its machines and accessories to China and the other Asiatic countries. Unlike many of the Japanese "war babies" whose export trade fell off as soon as the armistice was signed, the business of the Shibaura Engineering Works, due to the high quality of its products, has retained much of its export business, carrying it through the deep depression which followed.



2,500 H.P., 163 R.P.M. Rolling Mill Motor made by the Shibaura Engineering Works

The perfection of its equipment and the excellent workmanship by export operatives supervised by the best experts of America, combined with strict code of business ethics has won for the company a reputation equal to the best of the American or European manufacturers. In the Orient they have no rival. The number of inventions on which the company holds patent rights covers more than 300, or far in excess of any other Japanese company. Its annual production is valued at Y.40,000,000 and during the war, this reached Y.50,000,000. It has paid steady dividends of twenty-five per cent. on its capital, of Y.20,000,000 of which only Y.8,750,000 is paid up. The company has a reserve of Y.4,062,720.



Cotton Mill Equipped with Shibaura Form K Induction Motors (double pulley four-frame drive) operating Spinning frames and twisters

In order to compete with the best foreign manufacturers and lower the cost of production, the company recently purchased more than 100 acres at Tsurumi, between Yokohama and Tokyo as a site for a complete new works. Here will be erected the most extensive plant of its kind in Asia, rivalling in equipment the best in Europe and America. The area of the present property at Shibaura is 24 acres, of which 14 are covered with buildings. The products of the company comprise: Direct and alternating current motors and generators, rotary converters, frequency changers, electric car motor equipment, transformers, induction regulators, switchboards, and protecting apparatus, electrice measuring instruments, electric fans and household appliances.

The Shibaura plant is equipped with two Lancashire boilers, 43 generators and 560 alternating current motors. The machine tool equipment includes 16 boring machines, 110 drilling machines, 95 grinding machines, 193 lathes, 9 air hammers, 6 rolling mills, 78 milling machines, 10 planing machines, 84 punching machines, 27 sewing machines, 18 screw machines, 12 shearing machines, 30 shapers, 14 slotting machines, 90 coiling machines, 38 fans and blowers, 51 hand cranes, 36 electric cranes, 133 special machines of all kinds, 42 moulding machines, 7 metal melting machines and 2 cupolas.

The officials of the company are: Mr. K. Iwahara, president, Dr. K. Kishi, managing director, Dr. Takuma Dan, Mr. M. Fujise, J. R. Geary, Dr. I. Notomi, O. Pruessman and B. Otake, directors, with Mr. I. Notomi, as engineer-in-chief, and Mr. Otake as business manager. The office force numbers over 1,078 and the factory workmen over 4,500.

No description of the Shibaura Engineering Works would be complete without some reference to the machinery department of the Mitsui Bussan Kaisha whose activities not only in Japan but in other parts of the world have contributed largely to the commercial success of this great experiment in international co-operation. The electrical business of the International General Electric Company in Japan has been for many years in the hands of this most efficient organization, and it is due entirely to its progressive members that Japan to-day is using more apparatus made by the General Electric Company than any other foreign manufacture. At the head of this organization is Mr. K. Nanjo, the managing director of the machinery department of the M. B. K., who has surrounded himself with a group of super-trained experts whose activities in all the branches of the company have resulted in its magnificent showing in sales.

Development of Japanese Electric Light and Power Business, 1912-1922

H. C. Hugins (Tr. and rewritten from an article in the Toyo Keizai Shimpo—"Oriental Economist," Sept. 23, 1922)

THE number of companies actually engaged in electric enterprises, light-power railways, in Japan increased from 327 in 1912 to 696 in 1922, about 112 per cent. The authorized capitalization of these companies increased in the same period from Y.373,500,000 to Y.1,765,000,000 about 372 per cent. Including government enterprises and private enterprises the available power generated increased from 462,000 kilowatts to 1,527,000 kilowatts, an increase of 231 per cent.

The outstanding feature of the development of the past ten years is the sudden rise of the water-power industry to a place of predominant importance. This rise is shown in the following tables :—

TABLE 1. NUMBER OF PLANTS

Year		Water Power: Open to business	Water Power: Not open to business	Steam Plants: Open to business	Steam Plants: Not open to business
1912	..	391	112	979	158
1913	..	510	102	1,099	96
1914	..	695	133	1,245	74
1915	..	943	112	1,297	56
1916	..	1,195	117	1,422	64
1917	..	1,331	137	1,560	75
1918	..	1,504	226	1,636	84
1919	..	1,755	303	1,708	114
1920	..	2,035	427	1,799	142
1921	..	2,434	411	1,890	118

TABLE 2. POWER CAPACITY OF PLANTS EXCLUSIVELY FOR POWER AND ELECTRIC RAILWAY SUPPLY.

Year		Total Capacity	Water power Generated	Percentage of Water Power
1912	..	355,000 kilowatts	199,000	56 per cent.
1913	..	459,000 ,,	286,000	62 ,,
1914	..	555,000 ,,	377,000	69 ,,
1915	..	574,000 ,,	395,000	69 ,,
1916	..	598,000 ,,	420,000	70 ,,
1917	..	653,000 ,,	454,000	70 ,,
1918	..	717,000 ,,	512,000	71 ,,
1919	..	789,000 ,,	576,000	72 ,,
1920	..	954,000 ,,	659,000	69 ,,
1921	..	1,088,000 ,,	759,000	69 ,,

TABLE 3. TOTAL POWER GENERATED IN JAPAN.

Year		Total	Water Power	Percentage of Water Power.
1912	..	462,000 kilo.	233,000 kilo.	50 per cent.
1913	..	597,000 ,,	322,000 ,,	54 ,,
1914	..	716,000 ,,	349,000 ,,	49 ,,
1915	..	772,000 ,,	341,000 ,,	44 ,,
1916	..	805,000 ,,	360,000 ,,	45 ,,
1917	..	876,000 ,,	457,000 ,,	52 ,,
1918	..	984,000 ,,	589,000 ,,	60 ,,
1919	..	1,133,000 ,,	800,000 ,,	70 ,,
1920	..	1,378,000 ,,	824,000 ,,	60 ,,
1921	..	1,527,000 ,,	915,000 ,,	60 ,,

If the reserves of steam plants were excluded from these tables the percentage of water power would rise to a very marked extent.

Comparing 1912 and 1921, water power plants increased 146 pre cent., while the number of plants utilizing steam power increased only 120 per cent. According to the latest figures the projected steam power plants will generate 175,000 kilowatts, while the projected water-power plants will produce a total of 1,068,000 kilowatts. The attention that Japanese industrial promoters are giving to water power is easily seen from these figures.

Not only have the electric power industries and their capacity increased during the past ten years, but the number of such enterprises with large capital has been steadily growing, and the outside limit of investment has risen also.

The following table shows the number of enterprises with capital of five and ten million yen organized during the period under review:—

Year		Enterprises capitalized at more than Y.5,000,000 Number	Enterprises with capital of more than Y.10,000,000 Number
1912	.. ..	8	8
1915	.. ..	14	14
1919	.. ..	16	22
1921	.. ..	18	44

There were only two enterprises with more than fifty million yen capital at the end of 1912, the Tokyo Electric Light Co., Ltd., and the Tokyo municipal electric bureau. To-day there are six companies having more than that amount of capital.

At the end of 1912 there were only eight companies which could supply between 5,000 and 10,000 kilowatts. At the end of 1921 this group of companies had increased to 51 in number, about 537.5 per cent advance. At the end of 1921 there were 46 companies generating more than 10,000 kilowatts, and this number was an increase of 411.1 per cent. since 1912.

There are many big power projects now under construction.

The Daido Electric Power Co., Ltd., expects to complete plants to generate 155,000 kilowatts from water power exclusively by the end of 1924. Mergers which this company plans to carry out, together with increases in equipment of the merged companies, will place more than 1,000,000 kilowatts in the control of this company alone by the end of 1931.

The Nihon Electric Power Company, a rival of the Daido, is hastening the construction of power plant construction so that it will have completed 130,000 kilowatts by the end of 1925. These two enterprises, together with the fact that there are now three companies in Japan capitalized at more than Y.100,000,000 show how Japan's electric industry has been expanding in recent years. The Tokyo Electric Light Company has only recently increased its capital to more than Y.220,000,000.

The following table shows the number of power plants, according to the amount of power produced :—

Power produced		1912	1921	Increase	Percentage of increase.
Under 50 kilowatts	..	800	2,783	1,983	247.9 per cent.
50-100 kilowatts	..	162	328	166	102.5 ,,
100-500 kilowatts	..	224	646	422	188.3 ,,
500-1,000 kilowatts	..	70	158	88	125.7 ,,
1,000-5,000 kilowatts	..	83	312	229	275.9 ,,
5,000-10,000 kilowatts		8	51	43	537.5 ,,
10,000 and more kilowatts		9	46	37	411.1 ,,
Total	.. ..	1,356	4,324	2,968	218.9 per cent.

(This table includes government and private plants)

As the business of the companies increased profits expanded. Income figures for 1921 are not yet available, but in 1920 the income of these companies from power supply alone was 15 times what it was at the end of 1912. Income from both light and power business, or power and electric railway business, etc., increased 10 times. The increase in the amount of power income shows the sudden increase of demand for power, during the war prosperity. The limited increase of income from combined business, especially income from light and railway enterprises, is largely due to the limitations of charges imposed upon these industries. The general tendency has been towards increasing prosperity, and the average profit, as a percentage of paid-up capital, increased from 8.3 per cent. in 1912, to 12.5 per cent. in 1920.

The following table compares details of income, expenditure and profit, in 1912 and 1920 :—

	1912	1921	Increase per cent.
No. of concerns	292	593	104
Income from lights	Y.25,600,000	Y.112,100,000	1,337
Income from power	5,700,000	92,400,000	1,521
Income from railways	21,600,000	89,000,000	322
Income from combined business ..	2,300,000	26,800,000	1,065
Miscellaneous income	3,100,000	31,200,000	906
Total	Y.58,400,000	Y.351,500,000	502
Expenditure ..	Y.36,400,000	Y.233,300,000	541
Profit	Y.22,000,000	Y.118,200,000	347
Profit percentage of paid-up capital	8.3 per cent.	12.5 per cent.	50

The figures given above show clearly the development of Japan's electric industry during the past ten years. They show that the use of kerosene and gas is on the decrease for lighting purposes ; that power in engineering enterprises, industry and communications is gradually being changed from steam to electric. This state of affiars is going to continue for many years to come, and there is an enormous amount of hydro-electric power available which no efferts have yet been made to touch.

At the end of 1921 the department of communications estimated that there were 7,850,000 H.P. that could be obtained from Japan's rivers and streams. Of this something like 1,400,000 H.P. are now operating or under construction, and licenses have been granted for the exploitation of another 3 332,000 H.P., which will soon be under construction. The balance of 3,100,000 H.P. remains untouched.

(*Note.*—Table 1 ; these figures include power generated by private, government and electric railway companies. The figures are those of the department of communications.
Table 2 ; these figures include power "held in reserve," and power generated by government power houses for private use is included.

Japanese Rolling Stock

THE Imperial Government Railways of Japan now operate 3,516 locomotives, 24 electric locomotives; 8,425 passenger coaches and 52,027 freight cars. The budget allowance for the fiscal year 1922-1923 is Y.42,000,000, with which 255 locomotives, 10 electric locomotives (2 ordered from England, 2 from Switzerland, 4 America, and the other two to be manufactured in the railways' own shops at Omiya, outside Tokyo), 770 passenger coaches, including 120 electric cars, and 2,580 freight cars, will be built. Automatic train couplers and air control equipment will be installed in all the cars owned by the railways. Air control equipment is now used by the Sapporo bureau of the railway department, and by 1928 all the railway rolling stock in Japan will be equipped with this apparatus.

Gary Names New Secretary

ANNOUNCEMENT was made on July 19 that Frederick R. Sites has been appointed private secretary to Hon. Elbert H. Gary, chairman of the United States Steel Corporation. Mr. Sites has been connected with the corporation for about eleven years in the following positions : American Steel & Wire Co., Central Blast Furnaces, Cleveland, O. ; Carnegie Steel Co., Homestead, Pa., metallurgical department ; United States Steel Products Co. (nine years). He was recently assistant manager for China for the United States Steel Products Co. During a portion of the years 1918 and 1919, Mr. Sites was treasurer of the Federal Shipbuilding Company, but returned to China when the export business became active after the war. Mr. Sites graduated from the Massachusetts Institute of Technology in 1899.

Grain Handling Equipment in Japan

Changing conditions in Japan have developed a tendency on the part of flour millers there to locate new mills at points where grain and flour can be handled with greater facility, in order to reduce freight and handling charges, which have become of increased importance through the rapid rise in labor and other costs. Reports received indicate that in the future new milling plants in Japan will be located close to shipping facilities, as in the ports at Yokohama and Kobe, and wheat will be imported in bulk rather than in bags and unloaded from steamers into warehouse by means of pneumatic or other conveyors.

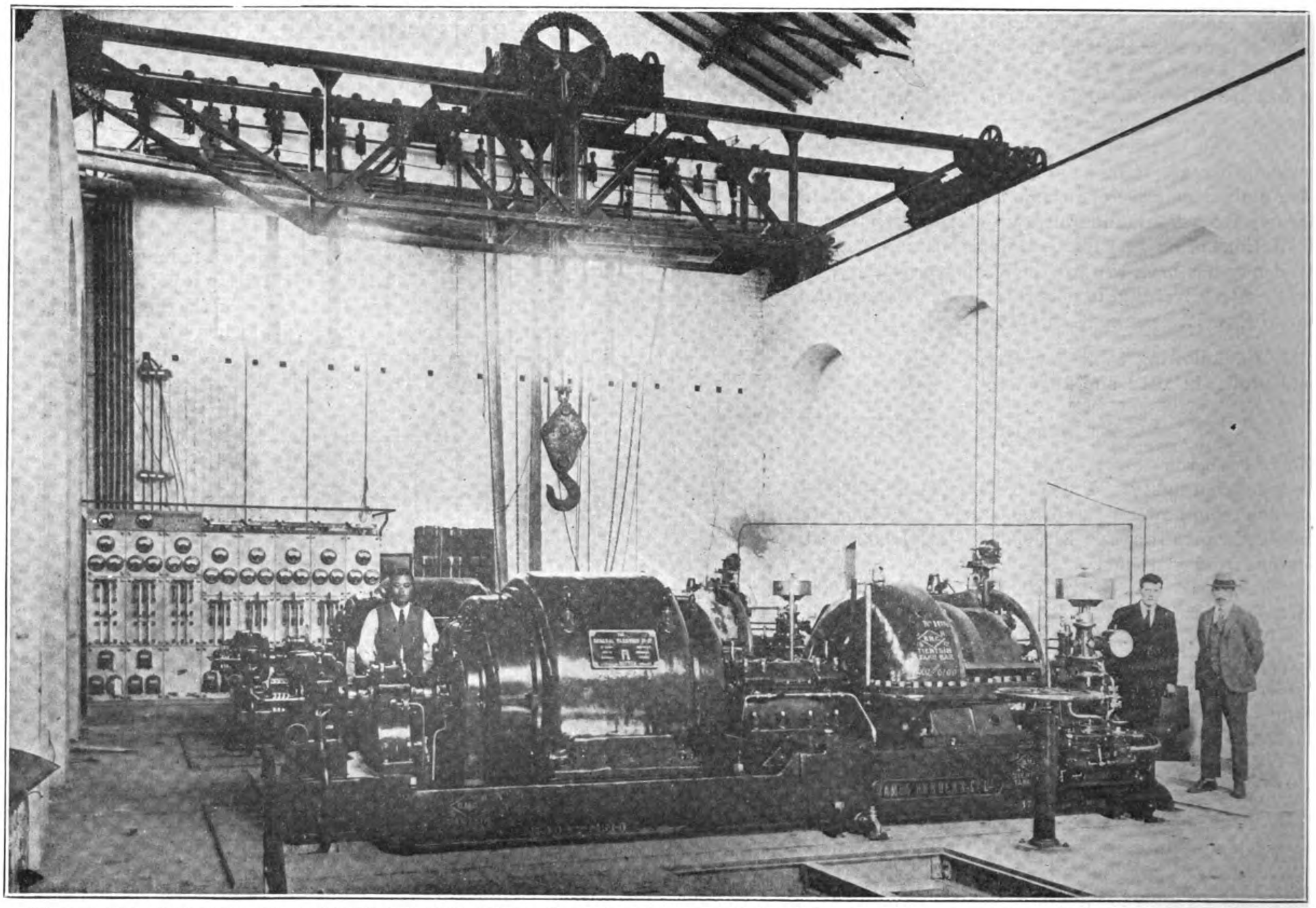
In view of the fact that there is a definite movement on the part of flour mill interests in Japan to adopt the above changes, it would appear that there is a definite market there for the conveying and other equipment needed when handling grain in this manner.

Buy American Railway Ties

The first sale of American railway ties ever made to the Imperial Japanese Railways was made recently. The order called for 260,000 Douglas fir ties, of which 60,000 were for jointments and 200,000 for straight rails. The average annual consumption of these railways is approximately 3,500,000 ties. According to Commercial Attaché James Abbott, Tokio, only companies which have been requested to do so may summit bids, and these companies seek to purchase in the market the kinds of ties specified in the tenders. A copy of specifications for railway ties for use on Japanese railways may be examined at the bureau of foreign and domestic commerce, Washington, or its district offices by referring to file No. 3702.

VOLTAGE OF TOKYO SUBURBAN RAILWAYS.—Because of the different voltages used on the three government electric railways operating around Tokyo city, it is impossible to use the cars of the Keihin line on the tracks of the others. The Yamate line which runs from Tokyo station to Shinjuku, Ikebukuro, and Nipporu, and the Chuo line from Manseibashi to Kichijoi through Yotsuya and Shinjuku, use 600 volts. The Keithin line, which was built later, uses 1,200 volt.

The motors of the cars on the Chou and Yamate lines will be rewound, and other necessary alterations carried out. To complete the work a large number of reserve cars is needed, and as the present number of carriages is not sufficient to handle the traffic, it has been impossible to make the necessary change before. But the railway department has recently ordered 36 new electric cars which will be completed this year for use on the newly electrified Tokyo-Numadzu section of the Tokaido line. These will not be needed until the end of 1923, or later, so they will be temporarily put into service on the round the city lines, while the voltage standardization changes are being effected.



Tientsin British Municipal Council's Electric Light Plant: Generating Room: 2-1000 K.W. sets of Howden Turbines Driving General Electric Co. Witton Generators: Alternating Current, 5,000 volts, 50 cycles, 3 phase, 3,000 r.p.m.

In the background is the low-tension switchboard for the station and local district. On the back wall are the cables for the high-tension feeders with lightning arrestors mounted above the windows. Above the machines is the 20-ton crane built in Tientsin

Tientsin's New Power Station

The British Municipal Council's Light Plant Ready

By O. D. Rasmussen

ELIMINATION of the personal element is a feature of the British municipal council's new electric power station constructed, under supervision of their electricity department, above flood level on the western bank of the Weitze creek in the British concession, Tientsin.

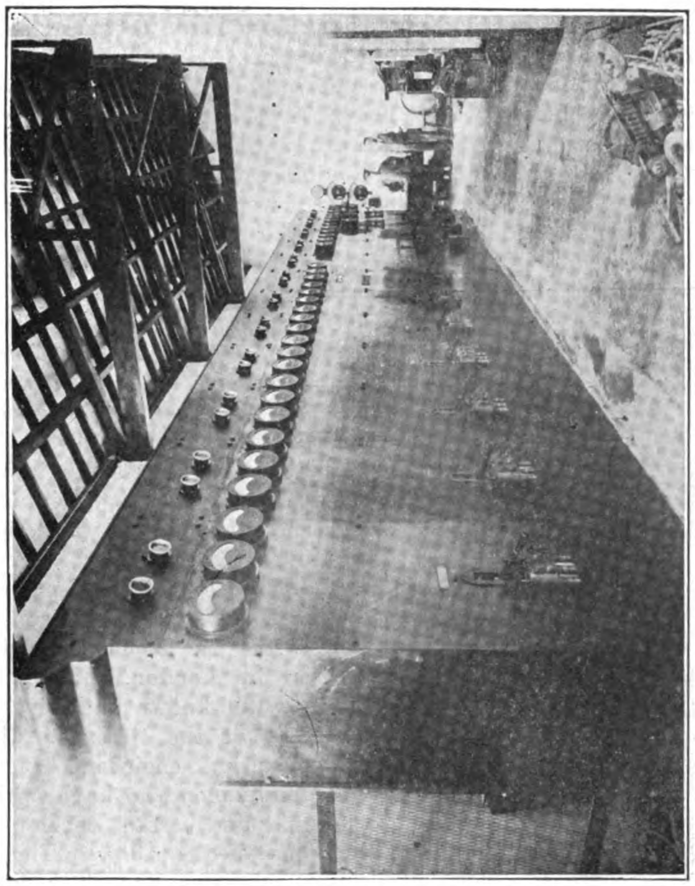
The present handsome structure of red brick and concrete, with its most up-to-date machinery, may be said to be the outcome of the amalgamation of the two former British administrations, so long the bone of contention among British residents of the port. When the British municipal concession joined hands with the British municipal extension and its additional extra-mural area, and threw their organizations and aspirations into common channels, the combined council seemed to take on a new lease of life. They decided to extend the sphere of municipal enterprise, refused to renew the expiring franchise of the old Tientsin Gas & Electric Light Company, and decided to build and conduct their own power plant.

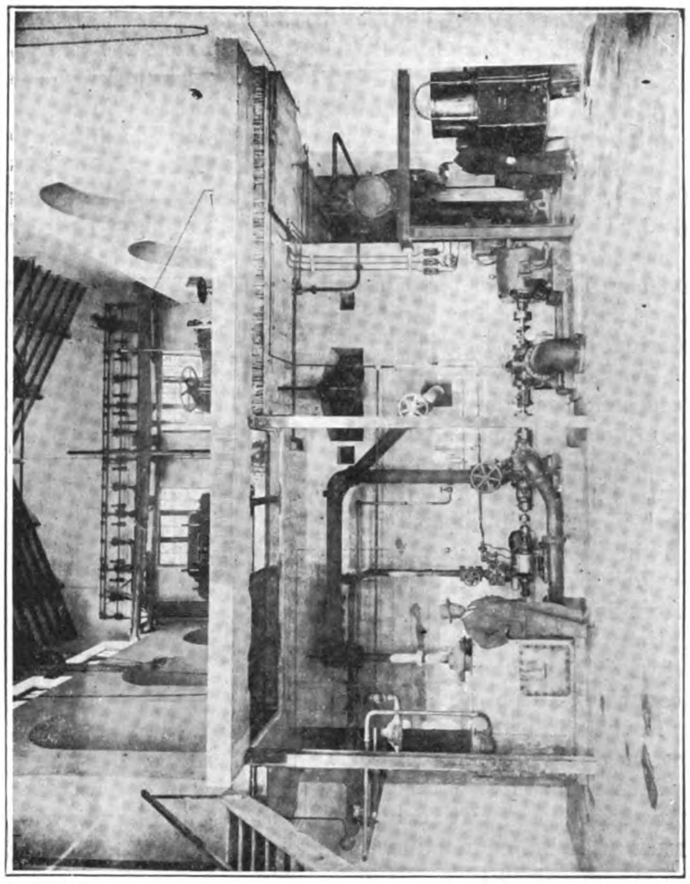
The old franchise expired about eighteen months ago and pending the installation of the present plant the British concession has purchased its electric energy and light from the French Electric Light Company. This company supplies a 5,000 volt alternating current and the British municipal electricity department transformed it down at temporary sub-stations according to the required pressure.

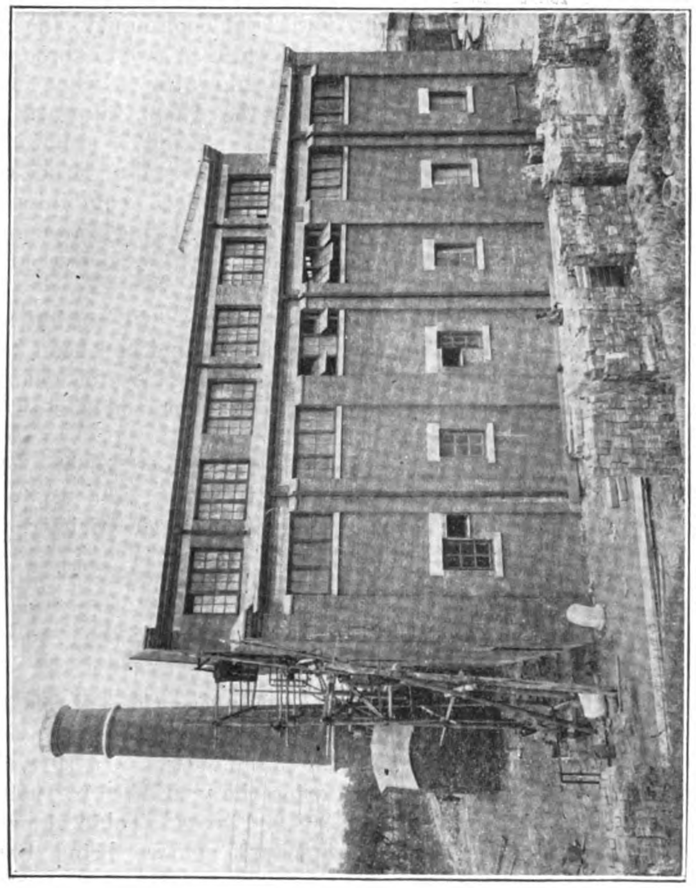
When the council decided to construct its own plant it was first planned to install two 500 kilowatts sets, alternating current, but it was soon found on investigation of the probable load that these would be insufficient. After thrashing it out in a public meeting, the council, acting upon the recommendation of its newly appointed electrical engineer, Mr. R. A. Williams, decided to install two 1,000 kilowatts sets, alternating current, 5,000 volt 50 cycles, 3 phase, to be transformed as required to 380 volt for power and 220 for light in the concessions. These sets have an overload capacity of 25 per cent.

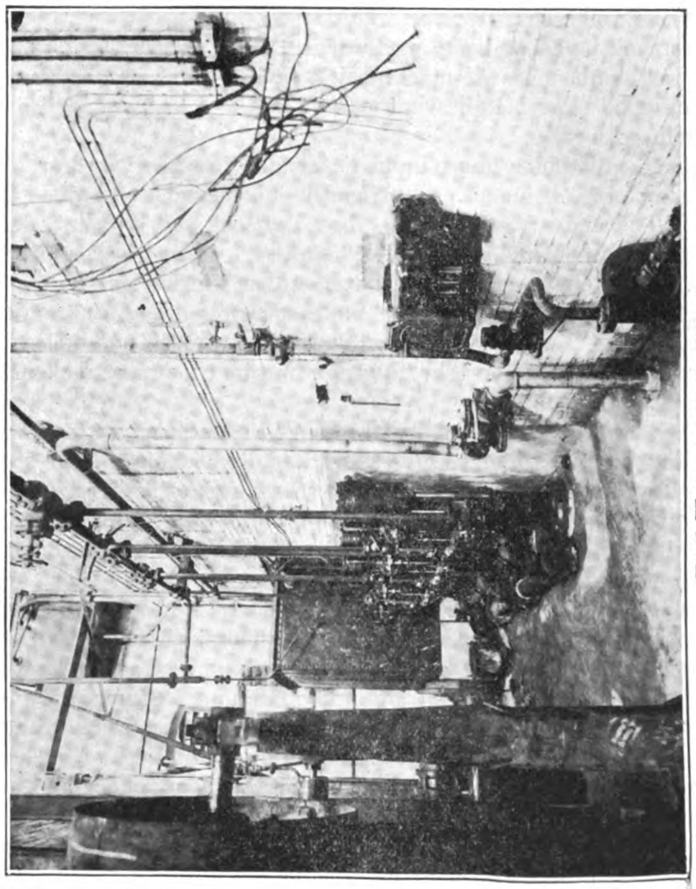
The Witton generators are direct driven by Howden patent turbines, running at 3,000 r.p.m. at a steam pressure of 195 pounds, superheated to 586 degrees, Fahr. and supplied by James Howden & Co., Ltd, Glasgow. The dynamos or generators were supplied by the General Electric Company, Birmingham, England. A feature of the turbines is a forced oil circulation, under continuous filtration, by two oil pumps are supplied for each generating set, of

BRITISH MUNICIPAL COUNCIL'S ELECTRIC LIGHT PLANT AT TIENTSIN


High Tension Switchboard and Gallery


Condensing Plant


General View of Power House


Feed Water Arrangements

which one is directly driven by the turbine shaft whilst the other, a steam reciprocating pump, is used for starting up the machine and as a reserve.

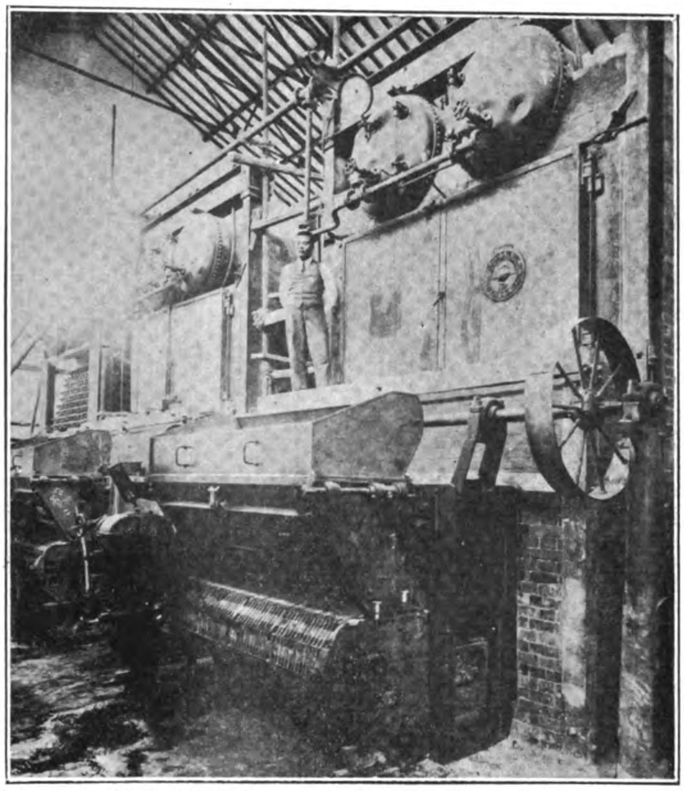
Dynamos are cooled by a forced air circulation, after passing through a special filtration to exclude dust. The condensing plant surface type was supplied by the Worthington and Simpson Company, London, and combines a circulating water pump, and air pump all of the rotary type, direct driven by electric motor.

The main high-tension switch board, supplied by Johnson & Phillips, London, is twelve panelled of the steel cellular type, and supplied with the various oil switches, etc., suitable for breaking loads of up to 40,000 kilowtts. This board is situated in a large room apart from but adjoining the dynamo room.

The low-tension switch board, designed and manufactured entirely by the B.M.C. electricity department, has eight panels and is of marble. It contains two sets of 'Busbars,' one for station or special use, the other for supplying neighboring districts with low-tension current. The remainder of the concession is supplied from the high-tension board and transformed down to the required pressure.

Under the switchboard room is the filtration chamber, where all air required for cooling the generators is freed from dust. The elimination of all dust from the generators is particularly important on account of the severe dust storms in the winter and the large amount of alkali contained in the dust. This room is also used as a meter testing laboratory to calibrate all meters used in connection with current supplied from this station.

The engine room is equipped with a well-designed 20-ton overhead crane constructed by the Eastern Engineering Works. This crane struck us as being a particularly well built piece of machinery and is a good example of what can be produced locally.



B. & W. Boilers with China Grate Stokers

The locally boiler house immediately adjoins the dynamo room, the steam pipes being of exceptionally short length to reduce the losses. The steam is generated in three Babcock and Wilcox boilers, each having a heating surface of 2,852 sq. ft., a superheater of 770 sq. ft. and a chain grate automatic stoker with a grate area of 65 sq. ft. Steam is supplied from these at a pressure of 195 pounds to the sq. inch. The automatic stoker is belt driven by an electric motor through reduction gear, thus eliminating the personal element as far as possible.

Feed water is supplied by three Weir's patent, vertical reciprocating pumps, which receive the water direct from a large steel hot-well, which is heated by exhaust steam from the force pumps. The water is obtained direct from the main water supply of the concessions, pumped into a small supply tank, under automatic control, thus again eliminating the personal factor. An artesian well is being sunk to a depth of 300 feet to serve as a possible source of clear feed water supply, more economical than that from the main supply. It will act a reserve supply in case of necessity.

The boilers were erected by Adair Graham & Company, now amalgamated with the Eastern Engineering Works, who are also sinking the artesian well. At present no economisers are is use, for when the station was designed the capital expense of economisers was found to be too great, comparatively, to show a saving in coal consumption. However, space has been provided for economisers, which can easily be installed without shutting down the station. For various reasons it was decided to use a comparatively short chimney stack, which is used in conjunction with a forced draft fan, belt driven by an electric motor.

The problem of dirty circulating water, which confronts all power stations in North China, owing to the great quantities of mud in suspension in all the principal waterways, has been attacked with what should be eminently successful methods. What appear to be elaborate arrangements have been made to guard against the difficulties arising out of dirty water. A tunnel has been built underground from the station out into the centre of the Weitze creek, well below water level. A 12-inch circulating water pump for each generating set draws through this tunnel creek water that must pass through a number of duplicate fine strainers, to exclude floatsam and suspended matter if these do not prove to be sufficient, moving or rotating strainers will be used.

The entire length of the Weitze creek is about to be deepened five feet, for concession drainage purposes, and at the station its course will be altered in such a manner that its centre will be moved fifteen feet farther away. The deeper water will tend to improve the quality of water at the intake.

The whole station was designed and its location fixed by the staff of the electricity department of the B.M.C., acting in conjunction with the council's engineer adviser in London, Mr. A. M. Sillar, a well-known authority and president of the British institute of consulting engineers. It was designed by men who have faith in the rapid and certain development of the use of this utility in Tientsin, and a corresponding faith in the future high status of this region as an industrial centre. Although not to be considered in any sense as yet an industrial community, the total load has risen in two or three years from 350 kilowatts to what is expected to be 1,000 kilowatts this year. The station is situated on the western bank of Weitze creek, at the west end of Bruce-road. The site is excellently chosen as the only place combining the facilities of large available quantities of circulating water and a convenient landing place for coal, which can be delivered by barges, fifty feet from the boiler house.

The illustrations which we reproduce show the station as it was being completed and before all the scaffolding had been taken down. The erection of the generating plant and switch gear has been entirely carried out by the electricity department staff and was completed in very quick time.

The engineer and manager of the department is Mr. R. A. Williams, M.C., B.S.C., A.M.I.E., E.A.M.I., MECH. E., who up to the outbreak of the war was consumer's engineer in the electricity department in Shanghai.

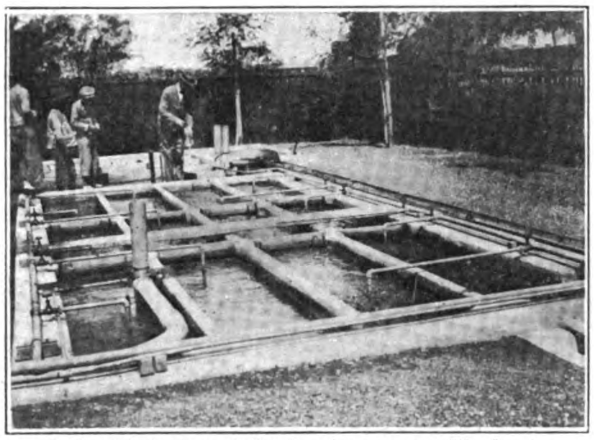
Japan Making Many Pencils

Japan has 117 pencil factories. No less than Y.6,900,000 (approximately $3,450,000. United States currency) is invested and 2,171 workmen are employed in this industry. In 1918 there were 1,292,082 gross exported. During the year 1916 to 1919 the total output of the empire was 9,868,000 gross. Tokio alone has eighty pencil factories, other important centres being Osaka, Hiroshima, Mie and Wakayama.

Up-to-date Sanitation for Shanghai

Three Activated Sludge Disposal Plants to Supersede the Offensive Pail System

AS the result of very careful investigations and studies on the part of its officials the municipal council of Shanghai has adopted the activated sludge process of sewage disposal as meeting the special requirements of the port better than any other system. During the past seven years this process has been developed from miniature laboratory models in the first stages of scientific observation to a practical and efficient working process capable of purifying sewage to a high degree. The development of this process has claimed the attention of sanitarians throughout the civilized world and promises to continue doing so in the future. The municipal authorities of many towns and cities in Europe and America have investigated and adopted the process as most applicable to conditions involved in their problems of sewage disposal, and it is gratifying to learn that the commissioner of public works of Shanghai was amongst the first to become interested in this new treatment as holding out a solution to the difficult problem that has confronted the model settlement in perfecting its sanitary arrangements.



A Small Activated Sludge Treatment Works in the Western District of Shanghai taking care of the Sewage from a Group of Private Houses

The difficulties surrounding the construction of a proper sewage system in Shanghai has claimed the attention of its municipal engineers for many years, but for a long time no real advance was made owing to the controversies as to the best methods to adopt. However, it was emphasized that, first, that in no modern large city having an adequate water supply distribution, has a water-borne system failed to become necessary or advisable and second, the cesspoll system in congested areas could only be considered as a temporate measure, and the difficulty in disposing of the contents in a manner inexpensive as well as satisfactory in other ways would continue to increase. Financial considerations for a long time also entered largely into the problem, as the revenues derived from contracting the collection of the night soil and its removal outside the settlement where it was sold to the farmers for fertilizing purposes, was a considerable item in the municipal budget, as will be appreciated from the fact that the amount paid monthly by the contractors increased from $3,200 in 1899 to $16,200 in 1920, and $15,760 in 1921, a yearly addition to the municipal treasury of about $200,000. The loss of this revenue would have to be made up by taxation from other sources. As Shanghai derives its potable water from the Whangpoo river at a point near the down stream extremity of the settlement, the usual method of discharging sewage into its natural outlet had to be abandoned because of tidal river difficulties, while the low elevation of the mud flat upon which the city is built made an ordinary gravity system out of the question. As Mr. F. G. Helsby, of the public works department, pointed out in a paper on the subject, the two main difficulties in designing a suitable sewage system for Shanghai centred around the facts that no natural fall can be obtained by reason of the contours and that the depth to which sewers can be laid and pump chambers constructed is very much restricted on account of the water-logged nature of the soil. It was found that in trench excavation trouble is generally met with at a depth of more than 10 or 12 feet. Even if this could have been surmounted, the question of discharge into the river would have necessitated the construction of a pipe line to a point somewhere near the mouth of the river in order to avoid contamination of the water supply.

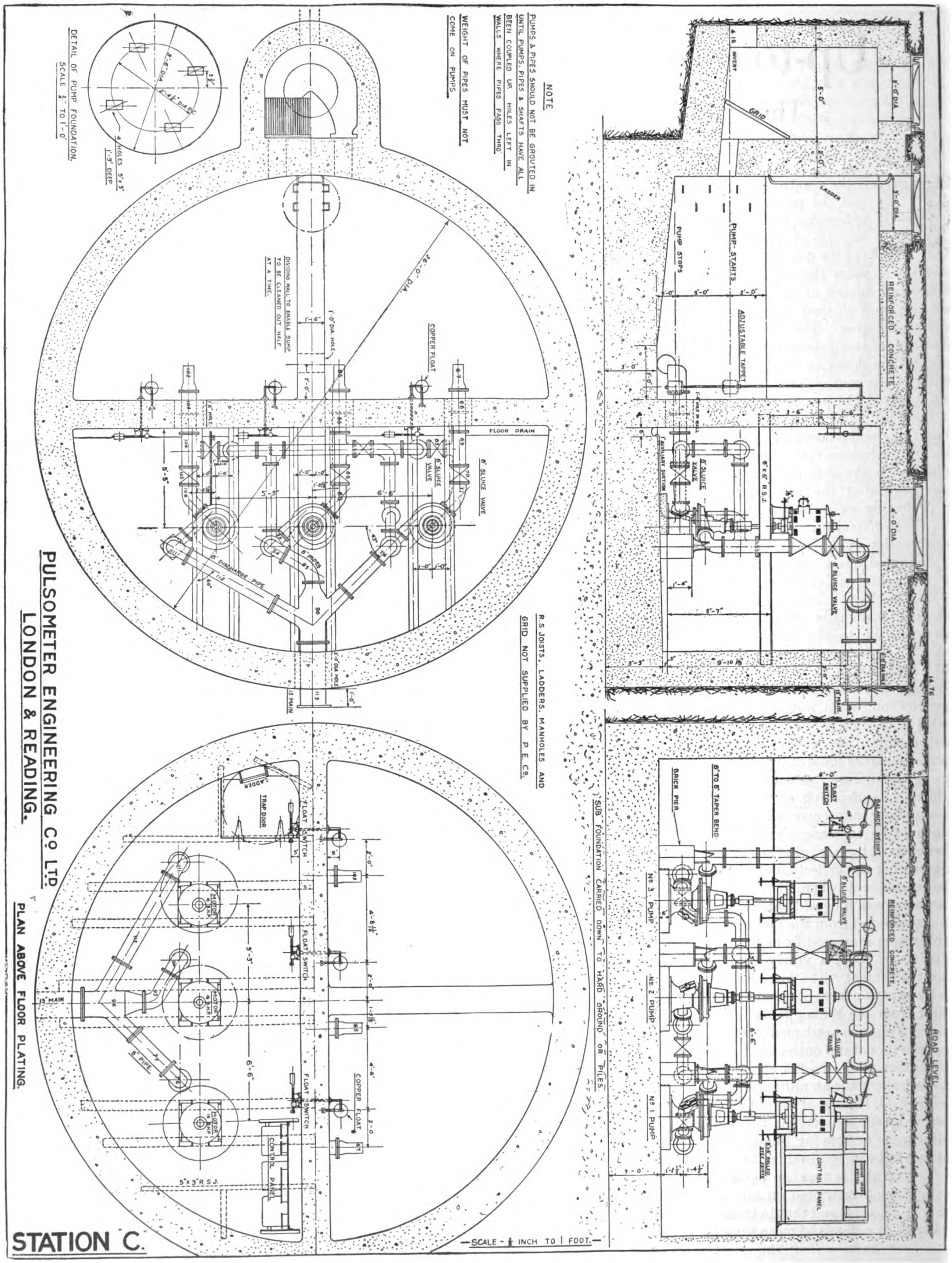
The activated sludge process came to the fore at a time when the problem of the disposal of Shanghai's sewage became most pressing and at once claimed the attention of the authorities as the most promising, efficient and economical method for application to the settlement. In designing the plans, arrangements were made solely for taking care of the actual discharge of closets, thus calling for a much smaller diameter of pipes and less work at the pumps and treating tanks. The storm waters in the settlement are taken care of by the regular drainage pipes discharging into the river, making two distinct systems of drainage in which the most offensive and inimical to the health of the community does not come into contact with the water supply at any point.

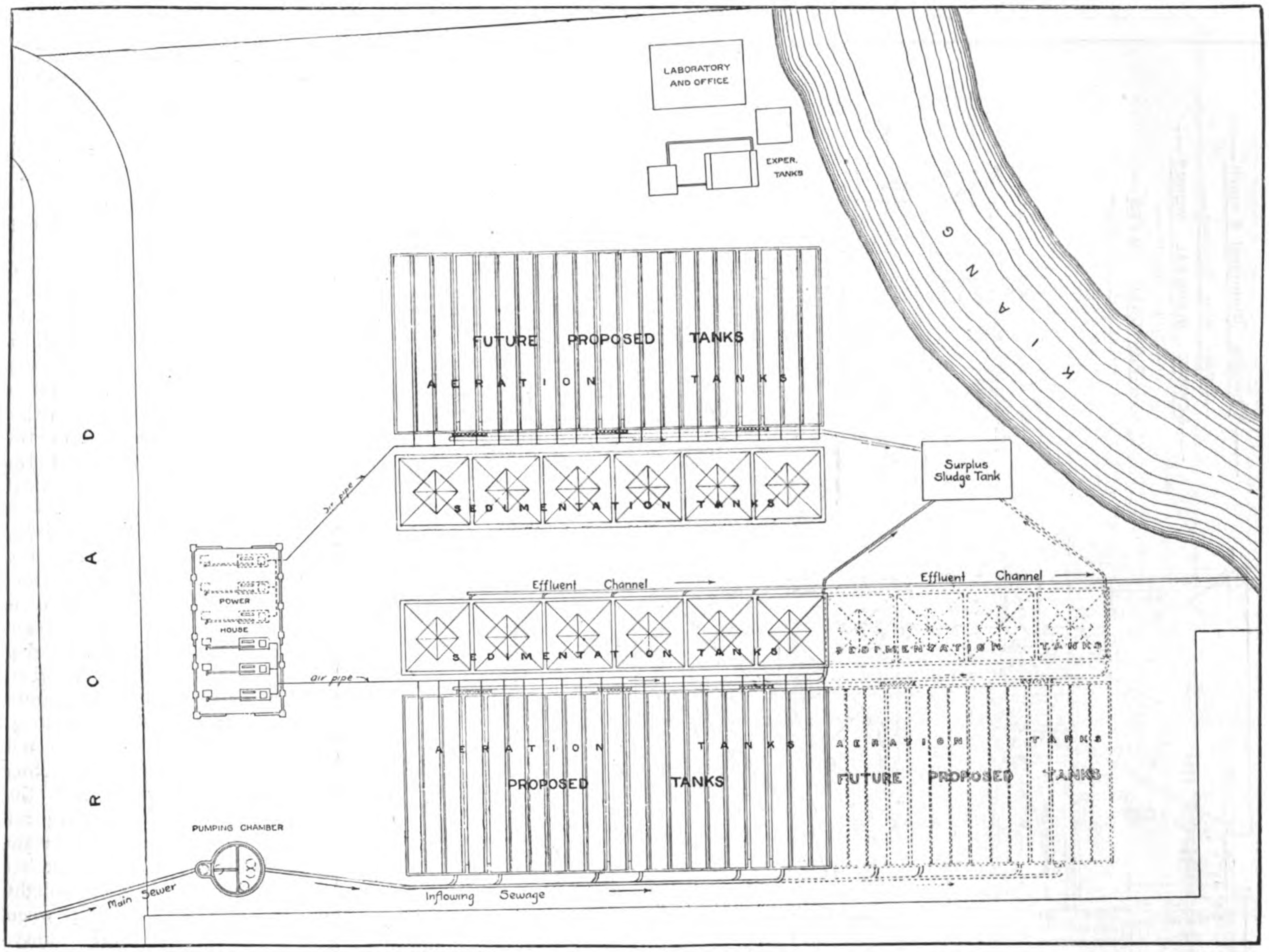
In designing the general plans to take care of the various districts of Shanghai, it was found more economical to divide the settlement into three separate districts with three separate treatment stations rather then one central plant. The scheme as finally adopted provides for the conveyance of sewage to three treatment works, one of these being situated on the land to the rear of the rifle butts, the effluent to discharge into the Sawginkiang, another being situated on land closely adjoining Brenan-road, the effluent to discharge into the Soochow creek, and the third to be situated towards the eastern end of the eastern district, the effluent to discharge into the Whangpoo close to the Point. The entire estimates of the cost of the scheme from 1921 to 1923 and subsequent program, amount to the comparatively modest sum of Tls. 3,870,000 including cost of land, or Tls. 3,750,000 exclusive of the land.

Although it would have proved more advantageous to have one central disposal plant, from the point of view of administration and initial cost, such a scheme would not prove economical on account of the vast amount of pumping that would be necessary. To pump sewage in any great quantities from the north to the south of the Soochow creek would be costly, and this would, of course, be necessary if it were decided to treat the whole of the sewage at one central site. The scheme is, therefore, based on lines of treatment at the three disposal sites referred to above.

Central District East of Honan Road

As the work on the central district serving the congested business area of the port is the most important and furthest advanced, it is possible to describe this at length. The same methods pertain to the other two districts. The sewers to be provided in the roads consist for the most part of 9 inches diameter concrete pipes. Surprise has been expressed at the small diameter of the pipes laid for the sewage system as compared with size of the surface and storm water sewage, but such views are due to incomplete knowledge of the position of such pipes in the general scheme, the volume of sewage to be provided for and the gradients and carrying capacities of the pipes. Criticism has also been made in respect to the use

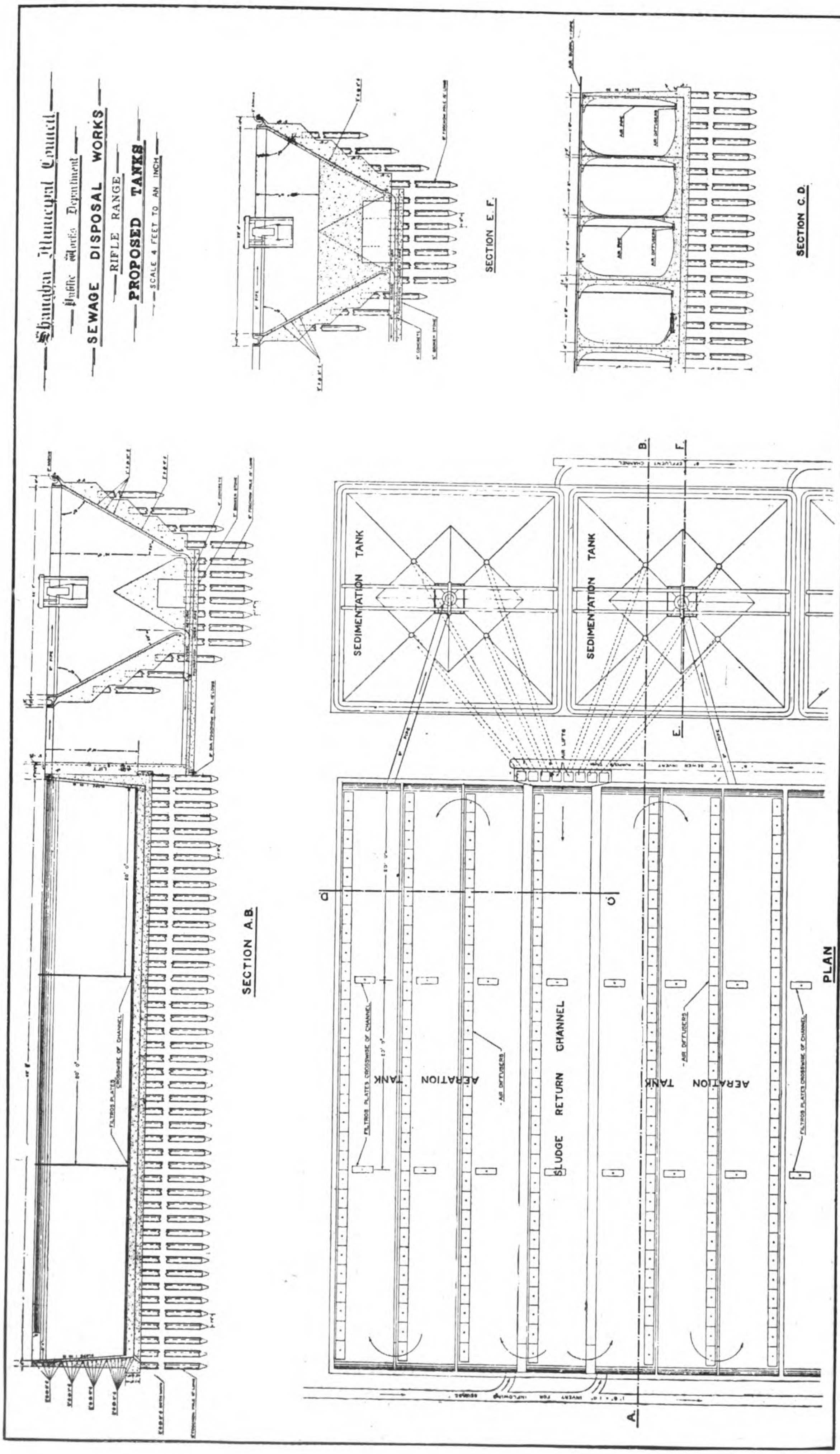

NOTE
PUMPS & PIPES SHOULD NOT BE GROUTED IN UNTIL PUMPS, PIPES & SHAFTS HAVE ALL BEEN COUPLED UP. HOLES LEFT IN WALLS WHERE PIPES PASS THRO'.
WEIGHT OF PIPES MUST NOT COME ON PUMPS.
DETAIL OF PUMP FOUNDATION.
SCALE ½" TO 1'-0"
4 HOLES 3"×3" 1'-9" DEEP
DIVIDING WALL TO ENABLE SUMP TO BE CLEANED OUT HALF AT A TIME.
COPPER FLOAT
FLOOR DRAIN
26'-0" DIA.
8" SLUICE VALVE
8" DISCHARGE PIPE
R.S. JOISTS, LADDERS, MANHOLES AND GRID NOT SUPPLIED BY P.E. Co.
PULSOMETER ENGINEERING Co LTD.
LONDON & READING.
PLAN ABOVE FLOOR PLATING.
LADDER
TRAP DOOR
FLOAT SWITCH
MOTOR
15" MAIN
8" PIPE
CONTROL PANEL
5"×3" R.S.J.
STATION "C."
SCALE - ¼ INCH TO 1 FOOT.
SUB FOUNDATION CARRIED DOWN TO HARD GROUND OR PILES.
GRID
INVERT
PUMP STOPS
PUMP STARTS
ADJUSTABLE TAPPET
REINFORCED CONCRETE
ROAD LEVEL
BALANCE WEIGHT
FLOAT SWITCH
BRICK PIER
8" TO 6" TAPER BEND
No 3 PUMP
No 2 PUMP
No 1 PUMP
8" SLUICE VALVE
CONTROL PANEL



of concrete pipes, owing to the failure of concrete pipes elsewhere. Notwithstanding that there have been cases of the failure of such pipes traceable to wrong design, improper material, bad workmanship, or a combination of all three, the fact remains that concrete sewer pipes have been giving excellent service since 1873 in many parts of the United States and since 1861 in European cities. Recent examinations of concrete pipe sewers, some laid in 1873 and others between 1874 and 1879, in different towns, have proved the pipes to be in first class condition. Investigations of concrete sewers in Vienna and Paris establish the fact that if the concrete is of the proper character, sufficiently dense and properly mixed, then sewage or sewage gases will have no effect on it. In view of the fact that the initial cost of the works could be greatly reduced by the construction of concrete sewer pipes locally, it was decided to adopt them. The nine inch size was determined upon as a minimum for the road sewers, notwithstanding that in certain localities a six or even a four-inch pipe would be theoretically sufficient for the conveyance of the sewage. Practical considerations relative to the choking and cleaning of such small pipes, however, influenced the selection of the nine inch as a minimum size. The main sewer in this district will run via the Bund, Whangpoo-road, Nanzing-road and Dixwell-road and terminate at the rifle butts treatment plant situated on the bank of the Sawginkiang.

The size of this sewer will increase from 12 inches in diameter at the Bund to 1 foot 6 inches by 1 foot, egg-shaped, after it leaves the central district. The pipes are laid so as to ensure a self-cleansing velocity to the sewage, this latter traveling by gravity from pump to pump *en route*, with the exception of the lengths crossing the Soochow creek, the Hongkew creek and the Sawginkiang. Pumping mains are provided over these crossings, one length of 1,250 feet and one of 3,115 feet being necessary to overcome these obstacles.

Underground pumping stations are provided at six localities along the main sewage line from the central district to the rifle butts. These stations, shown in the plans attached, are equipped with the R. C. Parsons patent type of "Stereophagus" vertical spindle self-clearing centrifugal pumps made by the Pulsometer Manufacturing Company of England. They operate at a speed of 700 rpm. and driven by protected type induction motors of 350 volts, 50 cycles and 3-phase supply. These motors are provided with automatic contact starting panels connected to float switches operated by float gears consisting of a positive system of rods and levers. Each pump is driven by a separate motor and any pump in a chamber can be operated independently or all in unison. The motors are provided in addition with a dual supply of current. The underground stations are to be equipped with two pumps, and in the case of some of the more important ones, with three, in which one pump in a chamber is a "stand-by" for use in an emergency or breakdown of the others. The plan shown in connection with this article shows a station equipped with three pumps. Station "A" is to have two 4 inch, "B," 2—6-in., "C," 3—6-in., "D," 3—6-in., "E," 3—6-in. and "F," 3—6-in. pumps. The special feature of these pumps is that they do not become choked by the passage of ordinary solids. The impeller, which is conical, has a number of spiral blades, which, working against a straight cutting blade,

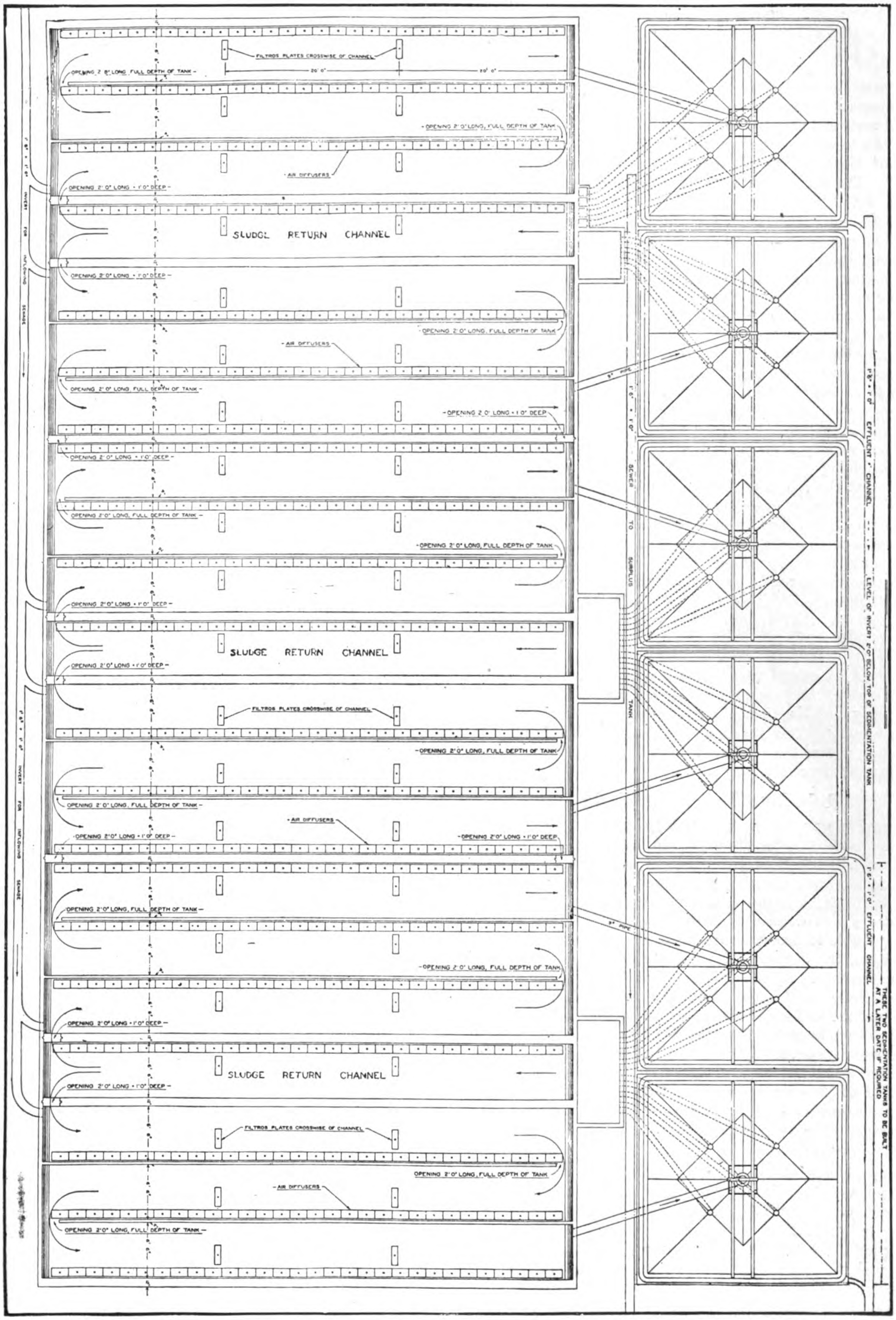


provides an action which is likened to that of a mowing machine, which effectively breaks and disintegrates any solid matter passing through the protecting screen in the outer chamber.

These underground pump chambers, as will be seen from the plans attached, are circular in form, 26-ft. diameter, sunk 17-ft. 6-in. below the level of the street with a 12-ft. depth inside. The walls are 2-ft. thick. The well is divided by a concrete partition into two chambers one for the pumps and motors and the other as a suction and float chamber. There is also a smaller 5-ft. diameter receiving chamber on the outside into which flows the sewage from the mains and in which is located a grid or bar screen to prevent heavy solids passing into the suction chamber. This chamber has a separate manhole for facility in cleaning. By means of a float connected to a rod operating directing on the motor switches the pumps are automatically set in motion when a certain level is reached in the suction chamber, and are brought automatically to a stop when the chamber is nearly empty. The suction chamber is divided by a wall to enable the pump to be cleaned out half at a time without interfering with the regular operation of the system. The pump chamber is also divided into two sections by a floor plating upon which are installed the electric motors and the control panels. In the lower section are the pumps.

Central District West of Honan Road

This provides for the area west of Honan-road in which the main sewage will flow by gravity after it leaves the central district through the mains on Bubbling Well-road. The only pumps necessary to deal with this area will be three six inches at the junction of Bubbling Well and Thibet-roads. The sewage will gravitate to this point by two main sewers one of 12-inches diameter traversing Hankow-road and Tibet-road picking up the


FILTROS PLATES CROSSWISE OF CHANNEL
OPENING 2' 0" LONG, FULL DEPTH OF TANK
OPENING 2' 0" LONG × 1' 0" DEEP
AIR DIFFUSERS
SLUDGE RETURN CHANNEL
SEWER TO SURPLUS TANK
EFFLUENT CHANNEL
LEVEL OF INVERT 2' 0" BELOW TOP OF SEDIMENTATION TANK
THESE TWO SEDIMENTATION TANKS TO BE BUILT AT A LATER DATE IF REQUIRED
INVERT FOR INFLOWING SEWAGE

sewers in the area south of Nanking-road, and another 12-inch main viâ Ningpo and Lloyd-roads. The subsidiary sewers draining into these mains will all be of 9 inches as in the northern district.

Western District

The main sewers for the service of this district will connect with the mains of the central district at the Thibet-road station and will travel westward along Bubbling Well, Hart, Yuyuen and Brenan-roads to the treatment works, subsidiary mains entering at the junction of Mohawk, Burkill and Gordon-roads with Bubbling Well-road. The main sewer from Tibet to Mohawk-road will be 1-ft. 6-in. by 1-ft. egg-shaped, Mohawk to Gordon-road, 2-ft. 3-in. by 1-ft. 6-in. egg-shaped, and from Gordon-road westward 3-ft. by 2-ft. egg-shaped. The pumps required on this line will be three nine-inch pumps at the junction of Gordon-road, three 10-in. in Yuyuen-road west of Tifeng, three 10-in. in Brenan-road east of the railway crossing, three 10-in. in Brenan-road east of the Fahwah creek, and three 10-in. at the treatment site, one pump in each case to be in reserve.

To pump the sewage from the area bounded by Thibet-road, Chengtu-road and Avenue Edward VII, it will eventually be necessary to install two 4-in. pumps at the junction of Weihaiwei and Mohowk-roads, the sewage being conveyed through a 12-in. pipe to join the mains on Bubbling Well-road. The sewage from the area bounded by Myburgh, West Soochow and Carter-roads, north of Bubbling Well-road, would be raised by means of two 4-in. pumps at the junction of Avenue and Chengtu-roads being conveyed by a 12-in. main to join the main sewer.

The sewage from the northern portion of the western district would involve the installation of two 6-in. pumps at the junction of Gordon and Robison-roads and two six-inch pumps at the junction with Connaught-road, the sewage being conveyed from the former station to the latter by means of a 12-in. pipe and from the latter to the main with its pump station on Bubbling Well-road.

Eastern District

The main line of sewer for this district will traverse Pingliang Dalny, Wayside, Paoting, Kwenming, Chusan, East Yuhang, East Hanbury and Yuenfang-roads, four pumping stations being provided *en route*. The site of the treatment works is near the eastern extremity of the settlement and the effluent will be discharged into the river near the Point.

Rifle Butts Treatment Works

The principle applied in the three treatment works of which the one at the rifle butts is typical and nearly completed, is the one of promoting agitation of the sewage by compressed air pipes leading into the vats, ensuring a constant supply of oxygen and bringing the bacteria in the sewage into continuous proximity to the activated sludge produced. With this system it has been proven that it is possible to produce an effluent of practically any degree of purification, the discharge liquid being almost as clear as the water from the taps. By the diffusion of air forced by compression through specially constructed plates the air bubbles rising from the bottom of the tanks and traveling upward through the mass of contained sewage keep the latter in a constant state of agitation and oxygenation. The amount of air required varies with the quality of the sewage under treatment and may range from three-quarters to 1½ cubic feet of free air per gallon. The area of the diffusion plates is about one-sixth of the tank area and the time occupied by the sewage in the tank is about six hours.

In the rifle butts works, there are now under construction four reinforced concrete sedimentation tanks of 20,000 gallons capacity each and six aeration tanks of reinforced concrete of 80,000 capacity gallons each. This plant is operated on the continuous flow system in which the air diffusion is obtained as above described by flowing air through " filtros " plates, a special form of air diffusion in which the plates are in cast iron cases resting on the bottom of the aeration tanks and so arranged that any one may be removed for inspection or renewal when necessary without interfering with the operation of the others.

The compressed air for the agitation of the sewage is generated at a power house nearby (60-ft. by 308) in which is installed three Ingersoll Rand Class " ERE-1" straight line belt-driven compressors driven by 22 h.p. electric motors with current supplied from the municipal electricity plant. The air cylinders of the compressors are 14-in. diameter by 10-in. stroke, having a capacity of 441 cubic feet of free air per minute, under a pressure of 10-lbs. per square inch, speed 250 rpm. and 22 h.p. Room is provided in the power house for doubling the compressor capacity as conditions warrant.

There are three air containers, one for each compressor, 3-ft. 6-in. diameter by 8-ft. high, with 5-in. outlet pipes leading into 8¾-in. cast mains tapering down to 6-in. at the end of the line. For the service of each aeration tank a 2½-in. galvanized iron pipe branches off from the main leading across the top of the tank, to which in turn are connected 27 regulating valves with ¾-in. down pipes fitted to their respective cast iron filtros on the bottom of each tank. The current of air arising from the side at the bottom gives the sewage a circular motion and in addition there are two filtros plates set crosswise in the tanks spaced twenty feet apart which acts as baffles and tend to retard the flow and prevents short circuiting.

The aeration tanks, of which there will be six with three sludge return chambers in the original installation at the rifle butts works, are rectangular in form, each with three channels, 52-ft. by 6-ft. 6-in. with a depth of 11-ft. The sewage enters the first series of tanks and is subjected to the continuous aeration process over a total distance of 180-ft., during which time it is kept constantly agitated and brought into contact with the sludge, the partially clarified liquid passing off at the top to the sedimentation or setting tanks.

Six of these tanks are provided for in the original installation at the rifle butts works. They are also constructed of reinforced concrete (22-ft. by 22-ft.) at the top. Ordinarily these should have tapered down to one outlet at the bottom, but owing to the nature of the soil, could not be carried down to more than 14-ft. on a pile foundation, and to obtain the necessary outlets it became necessary to modify the construction of the tanks so that there would be four outlets instead of one. The partially clarified sewage passes from the first series of aeration tanks by a 9-in. pipe to the sedimentation tanks, where it is allowed to settle, the clear effluent draining off at the top and discharging through an open channel into the nearby creek. The thick sediment or sludge so essential to the bacteriological part of the process is drawn off through the four 9-in. outlets at the bottom of the tanks into an air chamber where it is forced up by compressed air and delivered back to the sludge return tanks forming part of the aeration tank system, thus providing a continuous process. When the thick sludge accumulates to an extent beyond the requirements of the process it is drawn off and sundried on a sand bed, or it can be sold to the farmers in a semi-solid state as fertilizer. The residual sludge when thus dried resembles baked mud. Its high nitrogen content makes it of great value as a fertilizer.

Provision has been made in designing the rifle butts disposal plant for all necessary extensions as the demand upon the works increases by a larger flow of sewage. The plant also has a bacteriological laboratory attached where constant inspection of the sludge is carried on.

Prior to finally recommending the adoption of the activated sludge system by the Municipal Council, careful investigations were made as to the results of this system in England and the United States and the satisfactory results obtained justified its use locally. The chemical and bacteriological side of the problem is under the control of a chief sanitation chemist, an official recently retained by the council, while the civil engineering work connected with laying the sewers, installing the pumping plants and constructing the treatment works and the manufacture of the concrete pipes, are under the supervision of the public works department.

When the system is completed Shanghai will have a plant ranking with the best of its kind in the world and the only one in Asia this side of India. Other large cities in America and England are adopting a system which does away with all nuisances hitherto connected with sewage disposal. The latest American city to adopt the system is Chicago which is about to embark upon a scheme for treating 263 million gallons per day, while the largest plant actually in operation is at Houston, Texas and the largest works under construction at the present time are those at Milwaukee. Shanghai has kept abreast of the times. G. B. R.

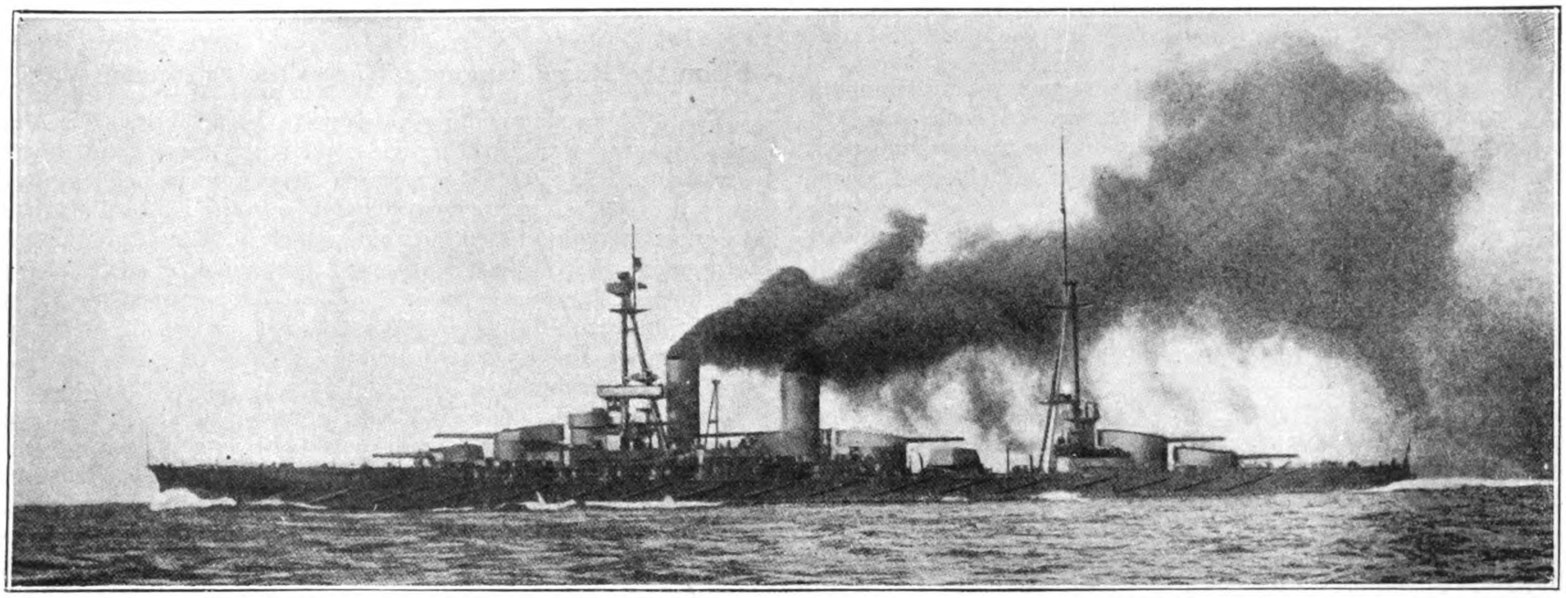
Shipbuilding Industry of Japan; Its History and Future

(*Translated and rewritten from an article in the "Oriental Economist," September 23, 1922*)

By H. C. HUGGINS

WHEN Admiral Perry sailed into the bay of Tokyo in 1853, the Tokugawa Shogunate was thrown into a panic, and as a result of the visit of the American fleet the two and a half century old prohibition on the construction of vessels large enough to sail the outside seas was withdrawn. The Shogunate government itself, at once began the construction of a foreign-style ship at Uraga, a vessel 132 feet long and 30 feet wide.

Encouragement was given to the diamyo to build large type vessels. As a result of the government's attitude by the time of the restoration of the emperor to his old unlimited power in 1868, there were seven shipbuilding yards in operation at Nagasaki, Yokosuka, Yokohama, Uraga, Ishikawajima (in Tokyo, on the Sumida River), Hyogo (Kobe), and Kagoshima.



H. I. J. M. S. "Hyuga." Gross Tonnage, 30,800, Built for the Imperial Japanese Navy at the Nagasaki Works of the Mitsubishi Shipbuilding Co., Ltd.

The yards at Nagasaki, Yokosuka, Yokohama, and Uraga belonged to the Shogunate ; the Ishikawajima yard was owned by the Mito Diamiate, the Hyogo yard by the Diamiate of Kanazawa and the Kagoshima yard by the lord of Satsuma. But these three feudal properties came into the hands of the imperial government in 1870. In that year the imperial government, in order to stimulate deep-sea shipping, promulgated a commercial ship law, by which assistance was offered to Japanese who would acquire ownership of foreign type vessels. In 1875 to further its desire that foreign type ships be adopted far and wide, the government prohibited construction of Japanese ships of more than 500 *koku* (50 tons). In spite of the government's acts the building of foreign type ships in Japan did not prosper in private hands, so that most of the shipbuilding was undertaken by the government.

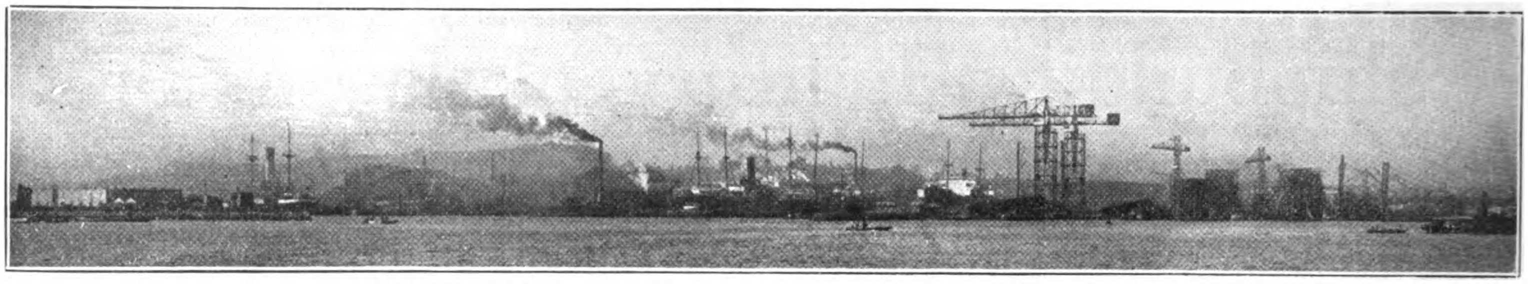
The following table shows the number of foreign type vessels owned by Japanese, registered in Japan from the fifth year of the restoration, 1873 to 1880:—

Year	Steamers. Number	Steamers. Tonnage Tons	Sailing Vessels. Number	Sailing Vessels. Tonnage Tons
1873 ..	2	32	2	91
1875 ..	14	462	—	—
1878 ..	25	912	51	5,204
1879 ..	19	839	50	5,781
1880 ..	40	3,186	146	10,889

The wars with Satsuma and Formosa in the last five years of the seventies made great demands upon Japanese shipping, and private shipbuilding yards began to spring up to satisfy the demand for vessels. In 1881 the Osaka Tekkojo (Osaka Iron Works) was established, and the Ono Shipbuilding Yard was opened to business in 1884. The government took advantage of the tendency of private capital to interest itself in this new industry, and the Nagasaki Shipbuilding Yard which in 1874 had been leased to the Mitsubishi interests, was sold to them in 1884, while the Kobe Shipbuilding Yard, leased to the Kawasaki interests in 1876, was sold to them in 1884. About the same time the Ishikawajima and Uraga Shipbuilding Yards were transferred to private management.

During this period, 1874-1885, the type of vessel constructed changed from wood to iron, but the number of iron vessels did not exceed 30 in all at any one time. The largest iron ship was under 500 tons, when the change to steel-built vessels was made.

In 1890 the Osaka Shosen Kaisha placed an order with the Mitsubishi Shipbuilding Yard in Nagasaki for two steel vessels of 610 tons each, and another order with the Kawasaki Shipbuilding Yard at Kobe, for two vessels of 576 tons each. These orders stimulated the development of steel shipbuilding in Japan. But with all the development of the industry Japanese shipbuilding yards were not able to construct vessels larger than these. The Nippon Yusen



A Great Japanese Shipyard. View of Yokohama Dock Company's Works at Yokohama

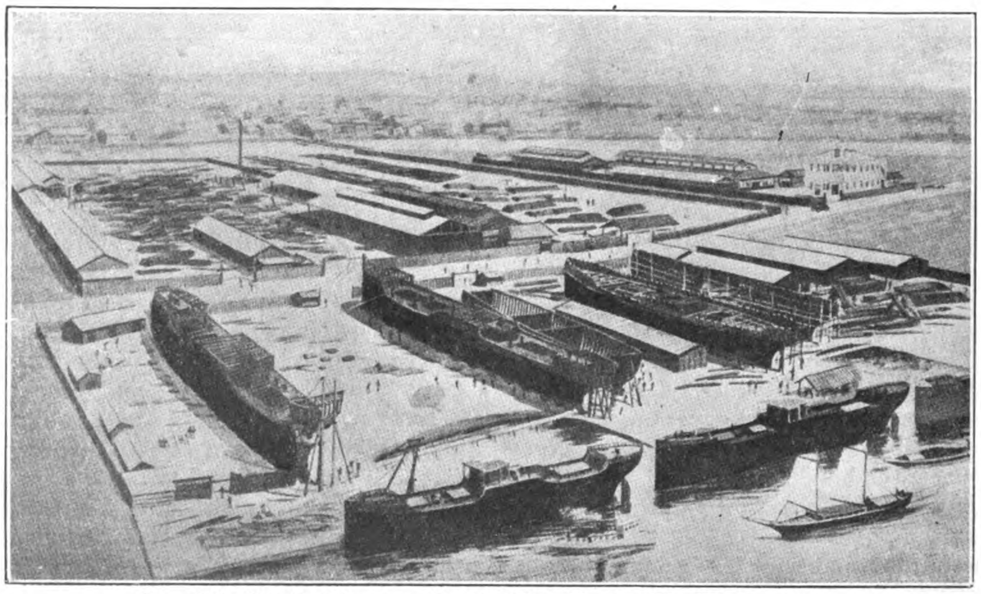
Kaisha was accordingly obliged to order its large iron and steel vessels abroad. As a matter of fact, before 1890 the shipbuilding industry had not yet caught up in development with the shipping interests.

From Sino-Japanese War to Russo-Japanese War

The shortage of large type vessels during the Sino-Japanese war was a great handicap to the Japanese people. The Japanese dockyards were unable to supply the size of vessel needed, and could conduct the repairs necessary to the existing fleets. However, during the war period the Mitsubishi Dockyard at Nagasaki built the *Suma Maru*, 1,160 tons, which was the marvel of the Japanese shipbuilding world at that time. It was the first vessel ever built in Japan of more than 1,000 tons burden and with a double bottom. Encouraged by the success of its experiment with the *Suma Maru*, the Mitsubishi Dockyard launched the *Miyajima Maru*, 1,592 tons, in 1897, and the *Tategami Maru*, 2,691 tons in 1898.

One of the results of the Sino-Japanese war was to stimulate the demand for better equipped shipbuilding and dockyards. In October, 1896, an act to encourage shipbuilding was promulgated, providing for a subsidy of Y.11 to Y.22 a ton on all steel steam vessels over 1,000 tons built in Japan. One of the immediate results of this act was the establishment of the Hakodate Dockyard Company. The Ishikawajima Dockyard Co. built a branch yard at Uraga, and a new company, the Toba Shipbuilding Co., was organized and opened a new yard. But the number of vessels constructed under this law was very small. The principal steamers whose makers were subsidized under this law were the *Tsukishima Maru* (tonnage unknown to-day), *Hitachi Maru*, 6,172 tons, *Taigen Maru*, 1,694 tons, and the *Awa Maru*, 6,133 tons. Even under the protection of this law the shipbuilders all showed losses on their construction accounts.

During this period the number of high-speed high-class vessels registered in Japan was entirely imported. The government accordingly amended the act of 1896, and in 1899 the subsidy granted shipping companies for maintaining overseas and interport trade was halved for those vessels purchased abroad. This act stimulated Japan's shipbuilding industry, and the number of vessels constructed at home began to increase. The table on the next column shows this effect.



One of the Smaller Japanese Shipbuilding Yards: The Works of the Osaka Shipyard Co., Ltd. at Osaka

VESSELS BUILT IN JAPAN BEFORE THE RUSSO-JAPANESE WAR

Year	Number	Tonnage
1899	52	15,421 tons
1903	128	37,314 ,,
Increase in 4 years	75	21,893 ,,

The government's interest in the development of shipbuilding stimulated the private owners to improve the equipment of their yards, and the efficiency of their workmanship was much enhanced in the years between the Sino-Japanese and the Russo-Japanese wars. As a result the Kawasaki Shipbuilding Yard in 1902 received an order from the Chinese government for one vessel, the first foreign order for a Japanese-build ship. In 1903 the same yard built the *Taisei Maru*, 2,287 tons, a vessel which was said to be one of the finest of its kind ever constructed in the world, considering the perfection of its equipment. This vessel has been used as a practice ship of the Tokyo marine school.

From the Russo-Japanese War to the European War

The existing shipbuilding yards were kept busy during the Russo-Japanese war repairing vessels for the army and navy departments. But at the same time they were launching new vessels just as fast as their equipment permitted. In 1904 the government accepted for subsidy nine vessels built in Japan with a total tonnage of 15,000 tons. In 1905 the tonnage of such vessels amounted to 13,000 tons. During the Russo-Japanese war the Kobe yard of the Mitsubishi Shipbuilding Co., was opened to business.

The principal feature of the shipbuilding industry during this period was the beginning of construction of destroyers in Japan.

Japanese shipbuilders had been constructing torpedoes for the navy, but until the period between the Russo-Japanese and the great war none of them had ever attempted to build destroyers. The Mitsubishi, Kawasaka and Uraga Shipbuilding Yards, and the Osaka Tekko-jo all built destroyers during this period. Eventually as their experience gave them more confidence some of these companies extended their work for the navy department to the construction of cruisers and even battleships.

With all the development up to this time, the *Tanba Maru*, 7,460 tons, was the largest ship launched and completed by a Japanese shipbuilder. But after 1907 the attention of shipbuilders was turned to the construction of vessels

of larger type, and the *Tenyo Maru*, and the *Chiyo Maru*, tonnage 13,500, with a speed of twenty knots were launched in 1907 by the Mitsubishi Dockyard. These two steamers were the largest ever launched on the Pacific Ocean, and the perfection of their construction, and the novelty of their equipment, placed them in the front rank of the world's finest passenger steamers.

During the Great War

The European war brought a prosperity to the Japanese shipbuilding yards never experienced before. The capacity of the yards increased by leaps and bounds, as can readily be seen in the following table:—

DEVELOPMENT OF SHIPBUILDING DURING THE GREAT WAR

	December 1913	June 1918
Number of shipbuilders ..	5	53
Authorized capital	Y.25,550,000	Y.163,050,000
Paid-up capital	Y.23,150,000	Y.109,554,000
Debentures issued	Y. 3,600,000	Y. 22,050,000
Number of yards	6	57
Number of slips	17	157
Number of workmen employed	26,139	95,197

(Only yards with capacity for vessels of 1,000 tons or more are included in this list. Also slips.)

Compared with December, 1913, the number of yards in operation the end of June, 1918, had increased by 48. The authorized capital of the companies had increased Y.140,000,000, and the number of slips, 140. Before the war the annual tonnage launched, of vessels of 100 tons and more burden, increased from 80,000 tons in 1913 to 700,000 tons in 1918. During the last term of business in 1918, the six largest shipbuilding companies made profits of more then Y.30,000,000.

The average of profit percentage on the basis of paid-up capital was 140 per cent. The fact that the Japanese shipyards were in a position to build 45 steamers, with a total tonnage of 375,000 tons for the United States government in exchange for steel, during the last years of the great war, is proof that Japan's shipbuilding efficiency had made great strides since 1913.

Recent Depression

The sudden end of the European war completely upset all these prosperous conditions. One after another newly opened shipbuilding yards were closed. After the financial crash of April, 1920, the depression in this industry was particularly severe. Between June, 1918, and June, 1921, the number of shipyards with a capacity of more than 1,000 tons decreased by 32, and the building slips of the same capacity decreased by 63. The tonnage of vessels constructed naturally decreased, the difference between the two dates given having been more than 203,000 tons, including sailing vessels of more than 100 tons burden.

On the contrary, while business was declining, the registered capital, and the issues of debentures, were increasing. This was largely the result of the increased needs for funds resulting from the panic. As a matter of fact, the six companies already mentioned made profits of only Y.7,452,000, during the second half of 1921, the percentage of profit to paid-up capital declining to 16.8 per cent.

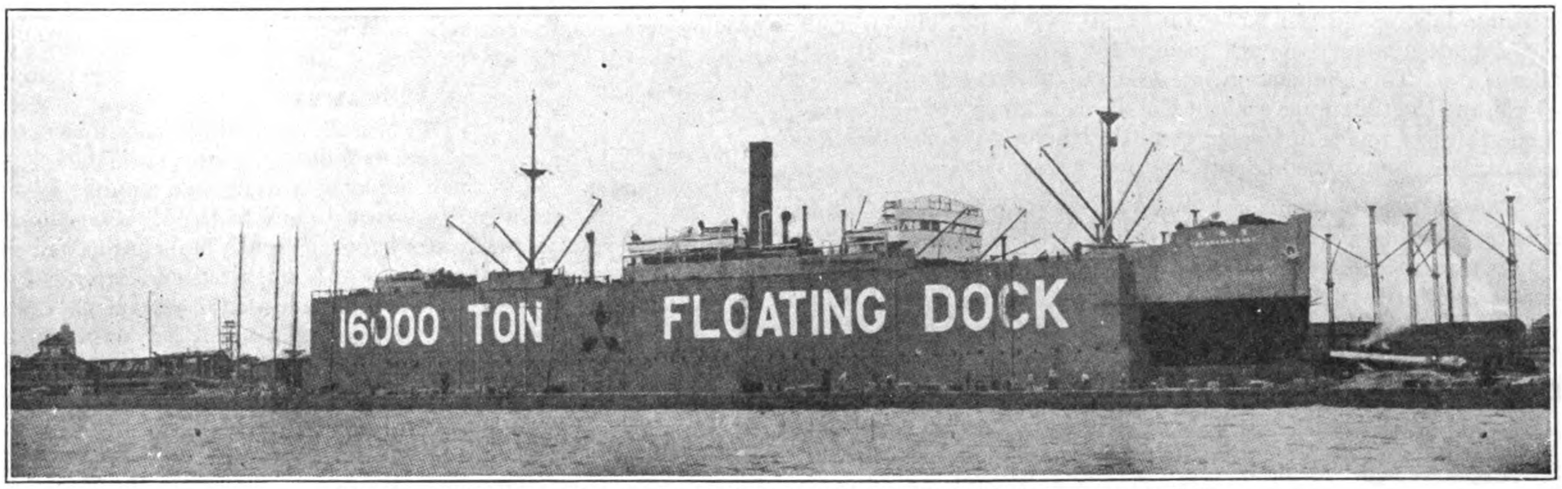
The Washington conference's decisions concerning the reduction of armaments have had a further depressing effect on the industry, as the large shipbuilding yards have lost a considerable amount of work for the navy department.

The following table shows the condition of Japan's shipbuilding industry after the great war:—

	June 1918	*June 1921*
Number of shipbuilders ..	53	21
Authorized capital	Y.163,000,000	Y.204,000,000
Paid-up capital	109,554,000	142,950,000
Debentures issued	22,050,000	28,470,000
Number of yards	57	27
Number of slips	157	94
Number of workmen employed	95,197	72,893

Position of Japan as a Shipbuilding Country

Before the great war Japan was hardly recognized as a shipbuilding country, but during the war Japan rose to third place in the amount of tonnage launched. In 1921 Japan dropped to fifth place. The following table shows this tendency :—



The No. 3 16,000-Ton Floating Dock of the Mitsubishi Shipbuilding Company at Kobe

SHIPBUILDING ACCORDING TO COUNTRIES

(*Tons*)

	1913	*1919*	*1921*
United Kingdom	1,922,000	1,348,000	1,538,000
United States, seacoast yards only	228,000	3,580,000	995,000
Germany	465,000	——	509,000
Holland	104,000	137,000	234,000
Japan	65,000	612,000 (3)	227,000 (5)
France	178,000	33,000	210,000
Italy	50,000	83,000	165,000
Total including others	3,333,000	7,145,000	4,343,000

The development of the shipbuilding industry, it is not difficult to understand from what has been written before, has been due entirely to the continued protection of the government, and to the adventitious advantages derived from war. Before the great war the capacity of all the shipbuilding yards in Japan was so limited that the needs of the ever growing shipping trade were met only by large imports of tonnage from foreign yards.

The special chance of the great war opportunity which gave Japan the third place in the amount of tonnage launched in 1919 has now passed. It is clear that the shipbuilding industry in Japan will continue to decline in importance and profit. There are two fundamental reasons why this will be so, the one the high cost of all shipbuilding material in Japan, and the other the extremely inefficient labor on which the industry must depend.

Japan is obliged to import practically all of its steel "shapes." There are some shipbuilding yards, it is true, which are equipped with machinery to manufacture steel, but their costs of production are prohibitive; importations are cheaper and of infinitely better quality. The costs of erecting the steel-making equipments is practically a dead loss to all the Japanese shipbuilding yards. In June, 1921, the Japanese government raised the import duties on steel, making its cost in Japan higher than ever, especially to an industry which depends on cheap steel materials to enable it to compete in the world's markets. In order to maintain stocks on hand for possible emergencies the fixed investments of all shipbuilding establishments must be much greater than the present condition of the money market, and the industry itself, warrant.

Despite an apparent advance in the efficiency of the Japanese laborer during the time of the war, his efficiency is still far below that of the workman abroad. Comparing the efficiency of the laborers in the Kobe shipbuilding yards with that of the laborers in the Weir yards in England, the efficiency of the British workman exceeds that of the Japanese by two to six times. The wages of these British workmen are only 328 per cent. higher than those of the Japanese laborers in the Kobe yards. It is not difficult to figure that Japanese labor costs are accordingly higher than the British labor costs. This comparison is based on the 1919 wage scale at Wier's, and the 1921 wage scale in Kobe. Even with wages in Japan at one-third of wages in foreign countries the costs of shipbuilding in Japan are going to be higher than those abroad.

These are the fundamental weak points of Japan's shipbuilding industry, but there are other weak points. The cost of equipment is higher than in other countries, and interest is higher. With a greater capital investment than that required in similar foreign concerns, and with interest from 3 to 10 per cent. higher than abroad, the position of the Japanese shipbuilding interests is decidedly not a happy one to-day.

The import tax of Y.10 a ton on foreign-built vessels more than ten years old, and of Y.15 a ton on vessels less than ten years old, does not make it possible for Japanese shipbuilders to compete with foreign yards for Japanese business even. In such case it is difficult to believe that the future of this industry in Japan is at all promising.

It is impossible for the government to extend more assistance to the shipbuilders without seriously disturbing the present balance of the nation's economics. The only means of getting the industry out of the hole it is now in are somewhat as follows:

1. Capital decreases to be carried out on a large scale thereby permitting dividends to be paid out of present business.

2. Mergers of existing concerns to be carried out under the direction of the most efficient companies.

3. Conversion of equipment, in part or all, to the production of other commercial products.

Even if mergers should prove impossible to bring about a syndicate should be organized to effect mutual savings on the purchase of equipment; to confine certain classes of work to certain yards; to establish a common reserve of materials, which could be drawn upon by all members at need, even in excess of their proportions.

Conversion to other lines of industry has been carried out by the Yokohama Dockyard and the Ishikawajima Shipbuilding Co., in some part with not indifferent success. Other companies will probably be compelled in time to follow their examples.

S.M.R. Development Schemes for 1922-1923

In order to further its development schemes (the majority of which have already been contracted for), the South Manchuria Railway Company has set aside the sum of 30,000,000 yen, with a reserve of 5,000,000 yen. In addition, the Company has a reserve of 18,000,000 yen brought over from the previous year. The principal works to be carried out, together with the amount to be expended thereon, are shown in the following table:—

	Yen.
Railways	8,466,271
Local administration	6,902,913
Mines	4,445,529
Electrical undertakings	2,007,881
Harbor works	1,710,171
Gas works	1,618,289

The proposed railway work includes the building of an additional track between Tiehling river and Chungku (13 miles), Chuanton and Shuangmiaotze (6½ miles), and Suchiatun and Wuchiatun (on the Antung line, 5.7 miles), rearrangement of the tracks on the Dairen wharves, and the provision of a bridge over the Tazeho. In addition to the building of a passenger bridge at Mukden station, the purchase of covers and sheets for the storage of general goods, it is proposed to install automatic signals at Mukden and Suchiatun, and rearrange the inter-routing of further signals at the principal stations. The scheme further includes the building of nine new goods locomotives, twenty passenger cars, seventy goods wagons, and the rebuilding of others on hand.

Local Administration

A new hospital will be built at Kirin, and additions will be made to the existing hospitals at Dairen, Wafaugtien and Tashichiao. It is also proposed to build a new school at Antung, and a public school hall at Fushun. Additions are to be made to the Mukden Middle School to serve as a preparatory for the South Manchuria Medical College. Roads and waterworks will be repaired and extended at Dairen, Antung, Kaiyuan and Mukden, and additional houses will be built for the employees at Harbin. It is further proposed to erect a seed supplying station at Kaiyuan and Changchun, and an agricultural experimental farm at Paintara in Inner Mongolia for the development of agriculture in that district.

Mining Work

The development of the open-cut mine, "Ronhoko," will be proceeded with, and includes the purchase of machinery, the laying down of additional railway tracks, and the provision of safety devices in the mines. In order to increase the quantity of tar obtained from the Lymu gas producer, a link, low temperature distillation apparatus will be installed. Repairs and extensions to waterworks and roads, and the building of additional houses for employees, are also provided for.

Electrical Development

The electrical schemes proposed include the continuation of the third power house at Antung and the transformer house. At Shakakou (Dairen), and the extension of the Changchun electric works. An ample supply of electric fixtures to the residents of Dairen, Mukden, Changchun, Antung and other places is also provided for. The tramways in Dairen will be extended, and additional passenger cars provided.

Harbor Works

The reclamation work begun two or three years ago at Jijiko and Shokoshi (east and west of Dairen respectively) will be continued and in addition the present dangerous goods pier at Jijiko will be rebuilt and the widening of No. 2 wharf completed.

Gasworks

It is proposed to complete the "third term" extension of the Dairen Gasworks; the proposals also include the building of further gasworks at Mukden and the laying of gaspipes at Dairen.

Japanese Builders Adopt American Methods

THE steel frame reinforced concrete building has come to stay in Japan. The movement for building reform started in 1917 resulted in sending Japanese architects abroad to study the best type of building construction adapted to the peculiar requirements of the country. With the placing of the contracts for the erection of the Mitsubishi, N.Y.K., and Nippon Oil buildings with the George A. Fuller Company of the Orient, a new era in building construction was ushered in. As a result of this co-operation, in which the Japanese have been educated in the most approved methods of modern American construction, several native firms have come to the front specializing in steel and reinforced concrete work.

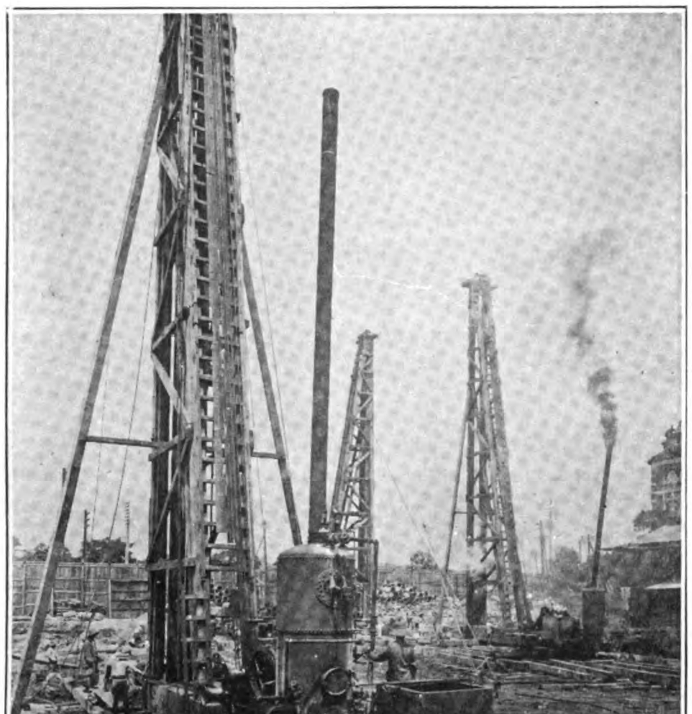
One of the best known Japanese construction and contracting companies, is the Shimizu Gumi, the oldest building concern in Japan. It is in business over 170 years and has erected many of the older office buildings of the capital. At the time of the Meiji restoration, this company constructed the Mitsui Kawase Za, the first modern bank in Japan, and which is now known as the Dai Ichi Ginko or First Bank. The concern was reorganized in October 1915 as a limited partnership (Goshi Kaisha) with a capital of Yen 3,000,000, and under the management of Mr. Kugokichi Simizu has since undertaken several important contracts for the erection of new buildings in Tokyo and throughout the principal cities of Japan. The firm has its own workshops at Shimada-machi in Fukugawa-ku in Tokyo and maintains branches in Yokohama, Kyoto, Osaka, Keijo and Dairen.

Elevation of the new Building erected by the Shimizu Gumi for the Katakura Raw Silk Spinning Company, Ltd., Tokyo

Another very old and successful construction firm, is the Obayashi Gumi whose headquarters are at Osaka. This is now a limited liability company with a capital of Y.2,000,000 half paid up, under the presidency of Mr. Y.Obayashi. It has branches at Tokyo and in Fukuoka prefecture last year declared a twenty per cent. dividend.

Tokyo Home of the Bank of Chosen

Keeping abreast of other important Japanese financial institutions, the Bank of Chosen, whose headquarters are located at Seoul, Korea, has just completed a magnificent six-storied new home in the heart of the financial district of Tokyo. This building, like others in the district, is of steel and reinforced concrete with the south and west and part of the east outside walls covered with granite up to the second floor, with white stone facing on two sides



Driving piles for the foundation of one of Tokyo's Office Buildings

Toyama Industrial Library. A handsome new structure in Shiba-ku, Tokyo

Reception Room Directors' Room

Okawa-Tanako Office Building, Tokyo, erected by the Shimizu Gumi for Messrs. H. Okawa and E. Tanaka

up to the lower edge of the windows of the fifth floor and the other two sides with artificial stone. The ground area is 2,400 square yards, of which 992 square yards are occupied by the edifice. The total floor space is 5,276 square yards with 150 square yards of attached boiler and motor house. The height to the upper edge of eaves is 97 feet.

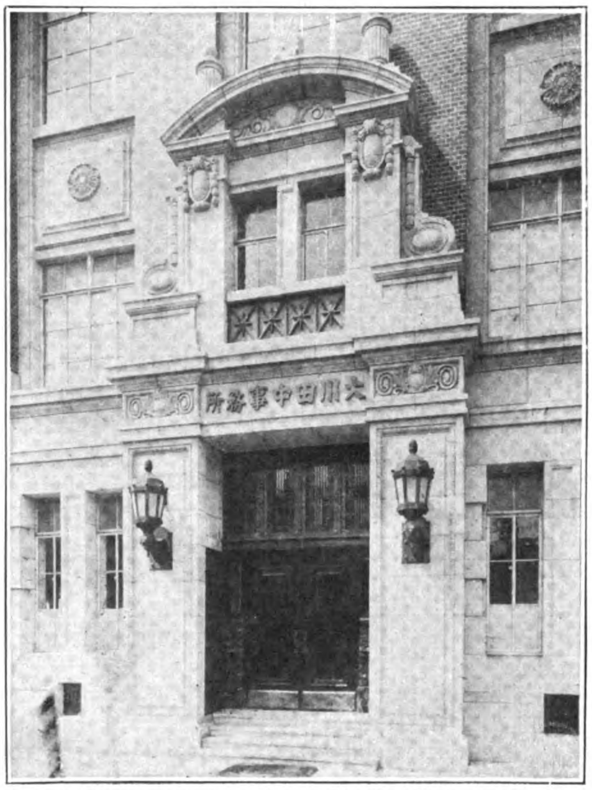
Inside walls and ceilings plastered and part of the walls finished with cloth. Floors are covered with linoleum, German tiles and hardwood. The dado and pillars of the main parts of the building, customers' waiting and reception rooms, the great hall on the fourth floor, are finished in marble, while in the rest of the building the dados and trim is hardwood.

The mechanical equipment of the building includes a power house containing a sectional German steam boiler, which supplies steam heat for all the rooms in the building and for operating a 50-kilowatt generator. Gas is supplied for a special kitchen in the basement. In addition, an automatic water supply pump is installed in the basement for keeping the tank on the roof filled for the general service of the building.

The building was designed and its erection superintended by Mr. M. Kuzunishi, Dr. of Engineering. The contractors are the Shimizu Gumi.

Okawa-Tanaka Office Building

This handsome new five story office building, located at No. 1 2-chome, Eirakucho, Kojimachi-ku, in the Marunoichi district of Tokyo, was commenced in April 1920 and completed in March of this year. The area of the building is 946 square yards with a total floor space of 4,630 sq. yards, height of 100 feet to the top eaves. The building is of steel frame with reinforced concrete walls finished in granite, white and artificial stone. On the first floor are the offices of the Okawa-Tanaka Company and on the second the directors' rooms while the third, fourth and fifth are for rent. The mechanical equipment includes various elevators, with a steam plant in the basement for electric lighting and elevator power.

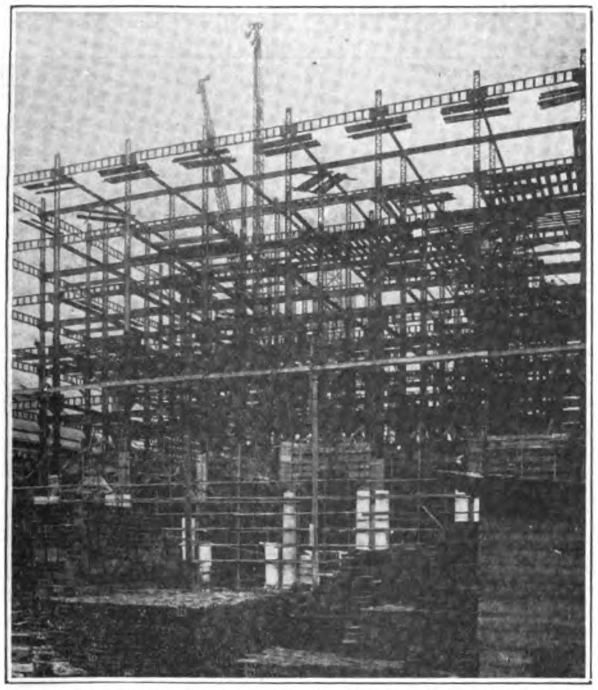


Entrance to the Okawa-Tanaka Building

Nippon Kogyo Ginko (Industrial Bank of Japan)

This eight story edifice is going up in the heart of the Tokyo financial district at Eirakucho, Kojimachi-ku, and covers 2,244 square yards of land, with an aggregate floor space of 16,240 square yards. The style is modern renaissance, steel frame, reinforced concrete with brick facing. The building will be about 120 feet high to the upper edge of the parapet, erected on a pile foundation with a concrete covering. All steel work is covered with reinforced concrete as well as the floors and staircases. In addition to the main structure there is a reinforced concrete garage and warehouse attached. The engineering equipment consists of a steam boiler for general heating and for supplying steam for an electric light and elevator power generator, water supply, filtering apparatus, etc.

An Erie Steam Shovel used by the Shimizu Gumi in Excavating Foundations in Tokyo



New Office of the Nippon Kogyo Bank. Now under construction in Tokyo: Contractors: The Obayashi Gumi

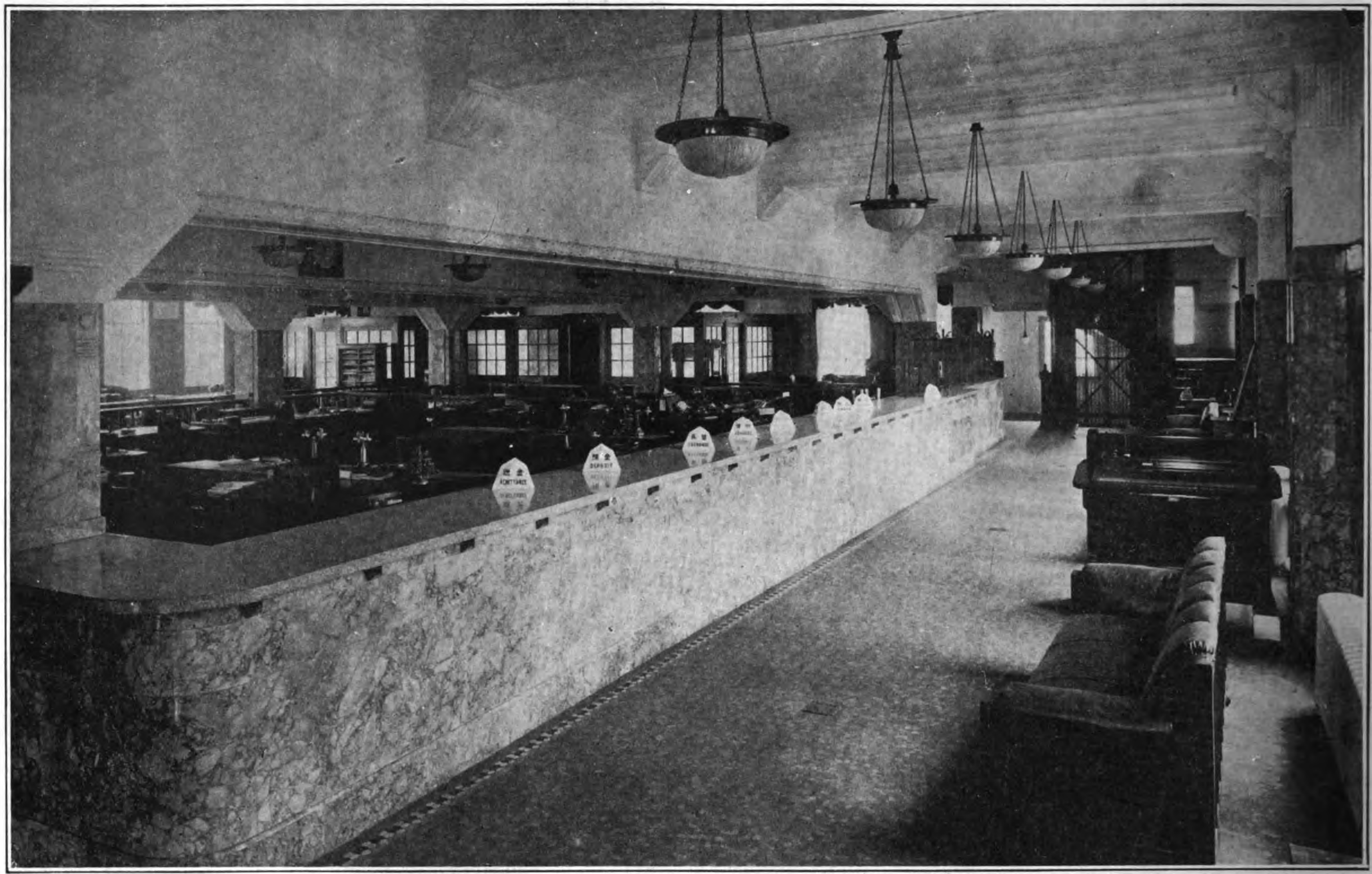
Katakura Raw Silk Spinning Co., Ltd.

This is an eight story front and ten story rear building under erection in Tatami-cho, Kyobashi-ku, Tokyo, 125 feet high from the pavement to the top of eaves and 150 feet to the highest part of roof. It covers 1,146 square yards with a total floor space of 8,100 square yards. The entire structure is of reinforced concrete with the outside walls finished with granite fancy brick and artificial stone. The ground floor is devoted to the engine room which is equipped with a steam heater for electric generator, hot and cold

Hoisting a 25-ton vestibule top to the 2nd floor of the Nippon Kogyo Bank building

New Tokyo Branch of the Bank of Chosen erected by the Shimizu Gumi: Architect and Superintendent of Construction, M. Kuzunishi, Dr. of Engineering

TOKYO HOME OF THE BANK OF CHOSEN



Foreign Banking Department

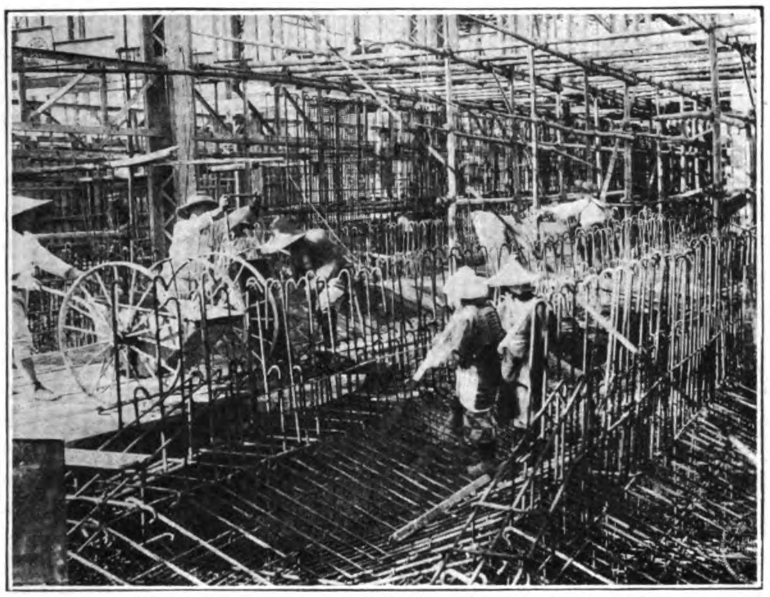
Main Banking Office

water supply, radiators. The building is fitted for gas and electricity with telephones in all rooms. Modern sanitary arrangements are provided for, discharging into a septic tank on the premises. The first floor is devoted exclusively to the use of the company and the second, third, fourth and fifth to offices for rent. On the sixth floor are located bed rooms for company employees and with baths and closets, while the seventh floor is given over to dining and conference rooms.

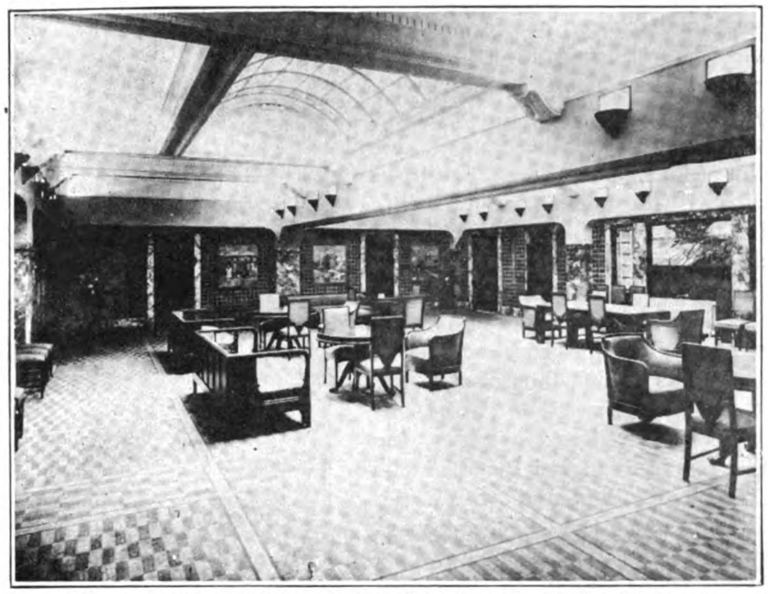
Fujiyama Industrial Library

Located in Shirakane Daimachi in Shinba-ku, Tokyo, this building will be three storys high and in parts five, with a height of 105 feet and total floor space of 534 square yards. The building is of red-brick with fancy brick and granite facings and trimmings, with part wooden and part reinforced concrete floors. In the basement is a steam and gas heater and water filter, billiard, rest room, bar, baths, etc. On the first floor is the office, reading and smoking rooms and study. The second floor has a dining saloon, lecture hall, conference and smoking rooms.

Entrance Hall: Okawa-Tanaka Building



Concrete Foundation Work by the Shimizu Gumi



Reception Room in the Tokyo Branch of the Bank of Chosen

N.Y.K. Rapid Express Service Liners

(Continued from page 690)

three sides, admitting a plentiful supply of light and air. A large well, opening into the social hall above, is surrounded by highly decorative bronze railings. The panels are painted in a soft shade of grey with mouldings picked out in white, after the manner of the exquisite "Petit Trianon" of Versailles. These, together with the very fine and appropriate furniture of the apartment give the saloon a refined and elegant appearance. The color scheme of curtains, etc., adds much to the beauty and attractiveness of the room.

The social hall is excellently planned and elegantly furnished, the color scheme being similar to that adopted for the dining saloon. There is a marble chimney-piece with an electric "magical fire," surmounted by a fine mirror in an ornamental gilt frame. The furniture, which is designed to afford comfort as well as aestehtic pleasure, is in the refined "Period" style, and includes a semi-grand piano.

Generally speaking, both the dining saloon and social hall are in the style of the Louis Quatorze period. The former room has as a character feature a very quiet and reposeful aspect, depending for this effect upon good proportions and refined detail in decoration, whereas the furnishing and decoration of the latter room are treated on brighter lines, so as to produce an air of cheerfulness and sociability.

The smoking room on the promenade deck is panelled in French walnut, similar in style to that which prevailed in England druing the "William and Mary" period, having a slightly Dutch influence in its detail. The centre of the room is high and has a segmental plaster ceiling with a large decorative wrought-iron and glass skylight. Sofas, easy chairs, card tables, all of the same "Period" style and a very, handsome chimney-piece with embellished carvings, etc., complete the furnishing and lend much to the restful effect of the room.

A verandah café, comfortably equipped with wicker chairs and settees adjoins the smoking room.

The entrances and staircases are panelled with dull-polished light-coloured French walnut. The handsome wrought-iron railing, of highly artistic design with dull-polished bronze handrails are the distinctive features which make the entrance hall extremely pleasing to the eye.

There are various kinds of staterooms, including an *en-suite* set, single berth, double berth and four berth cabins, etc. with different passage rates, thus offering a wide choice of accommodation to passengers.

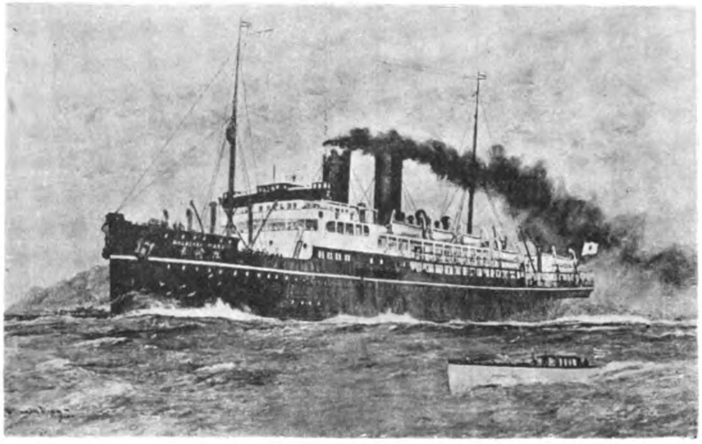
The rooms *en-suite* consist of a sitting room, a bedroom and a dressing room. The fittings and furniture in these rooms are of the best artistic taste and designs. All the staterooms are completely equipped and thoroughly fitted with the sole object of creating a domestic atmosphere and giving home-like comfort to the occupants.

A remarkable improvement will be introduced in the third-class accommodation. Every attention will be paid securing enlargement of space, efficient ventilation and lighting, and complete sanitary arrangements. Independent dining, smoking and bar rooms of European style will be provided in addition to a public room with matted floor, supplied with chess boards and other means of amusement *a la Japonaise.*

N.Y.K. Rapid Express Service Liners

Important Contribution to the Development of Shanghai

SINCE Shanghai was opened to foreign trade and residence in 1844, it has grown from a port of small commercial importance to one of the greatest of shipping and trade, not merely in the Orinet, but also in the world. Shipping is, of course, the principal source of life of the city, and the best idea of the immense development thereof may be gained from the fact that a total of 22,431,699 tons entered and cleared from Shanghai during 1921. This tonnage is dominated by British vessels, representing 8,287,470 tons or 37 per cent. of the total. Japan ranks second, representing 6,663,201 or 30 per cent. Of the various steamship lines engaged in the shipping trade of Shanghai, the N. Y. K. occupies a pre-eminent position, controlling by far the greater portion of the Japanese shipping of that port. The activity of the N. Y. K. dates back to 1885, when the branch office was established there, and it was by dint of steady application and unremitting endeavors that the present foremost position has been attained. The N. Y. K. office, godowns and wharves occupy and ideal place on the river front in the central part of the city. All the buildings and wharves are of considerable dimensions, and are equipped with all the modern arrangements for the convenience and facility of shippers as well as passengers. At the time of inception of this service the N. Y. K. operated two steamers of 3,000 tons gross each. But now it has 27,608 tons of shipping exclusively devoted to its Japan-Shanghai services, namely, the Yokohama-Shanghai line and the Osaka-Kobe-Shanghai line. Besides, most of the N. Y. K. ocean-going liners bound for Europe, India, Africa, and north and South America make regular or occassional calls at Shanghai on their trips east and west.



N.Y.K. Steamer

Thus is will be seen that within the past 37 years the number of the ships have increased by leaps and bounds, and the character of the services has also been improved in a remarkable degree, thereby contributing much to the promotion of trade and friendly relations between Japan and China. A further improvement is now being contemplated by the N. Y. K. Two fast steamers of 5,500 tons each, exclusively designed for the carriage of passengers on the Shanghai route, are now under construction by Messrs. William Denry's Shipbuilding Yard, Dumbarton, Scotland. They are to be christened the *Nagasaki Maru* and *Shanghai Maru* in honor of their official terminal ports. The former steamer was launched in the Scottish shipyards on March 14 last and the latter vessel took the water on August 23. As soon as their equipment is completed, they will be brought over to the Japanese waters to be commissioned on the service.

The advent of these two vessels on the service will mark a new era in the traffic facilities between Japan and China, as the steamers will be able to make the crossing between Nagasaki and Shanghai in about 26 hours instead of the 36 hours taken by the vessels now in service. Thus, travelers between points in Japan and Shanghai, or *vice versa*, will be able to economize time to a considerable extent, a similar facility and advantage being enjoyed by passengers between Japan and interior points in China. Special consideration will also be given to scheduling the departures and arrivals of the steamers so as to facilitate connections with the railways in Japan and China.

In fine, the N. Y. K. confidently believe that the new fast steamers will give the traveling public entire satisfaction and that the realization of the scheme in the immediate future will estahlish one more link to unite in friendly relations the countries of China and Japan.

Particulars of the New Liners

Particulars of the new vessels are as follows :

Gross tonnage	about 5,500
Displacement	6,150 ft.
Length O. A.	410 ,,
Breadth	54 ,,
Depth	32 ,,
Speed	18½ knots
Passenger accommodation :	
1st class	157
3rd	300

These steamers are built under Lloyd's special survey and comply with all the latest board of trade requirements for passenger ships. The doors of the watertight compartments are operated from the navigating bridge, so that the Captain can have instantaneous control over their complete system. The vessels are driven by twin-screws worked by single, geared reduction turbines of the Parson type, which reduce the vibration of the engine to a minimum, thereby ensuring the greatest comfort of the passengers. There are ten Scotch boilers working at a pressure of 200-lbs. The steamers are thoroughly equipped with modern life-saving appliances. All life-boats are worked by mechnical davits and motor winches. There is a set of emergency electric generators on the boat deck in addition to three powerful sets for ordinary use, and can be used at any time to supply electric current for wireless telegraphy, lighting, pumping, etc.—a most powerful asset in the event of accident. Precautionary arrangements for fire prevention are perfect. There are a number of fire-proof bulkheads and doors dividing the whole living quarters into many smaller sections, Each section is fitted with fire extinguishing apparatus of the latest pattern.

In regard to wireless installation, sanitary arrangements, and other equipment, the ships are in no particular behind any of the newest Atlantic liner. Needless to say, the utmost attention and consideration will be given to the arrangement, construction and furnishing of the public rooms and the staterooms, so as to give passengers the maximum of comfort and convenience, the greatest satisfaction, and even luxury. All parts to be occupied by passengers are specially well ventilated, and lighted. Perfect taste has been displayed throughout in the matter of style and decoration. The steamers will carry two classes of passengers, namely, first and third classes. The first-class accommodation is amidships. The public rooms include a large dining saloon, a spacious social hall as well as a comfortable smoking room and a bar. The other features are a verandah cafe, and an inquiry office, and unusually ample space devoted to the recreation and exercise of passengers.

The dining saloon is located on the awning deck forming the front part of the erection and has a large number of windows on

[*Continued at foot of previous page*]

The Machine Tool Trade of Japan

JAPAN buys all classes of machine tools—lathes, turret lathes, milling and drilling machines, gear hobbers and shapers, horizontal boring machines, planers, shapers, slotters, grinders of every description, electric and pneumatic tools, and many special machines. Machines are purchased in all sizes, from the bench lathe to the heavy gun turning lathe, and other machine tools in similar proportion. It is easier to say what machine tools Japan is not buying as yet—that is, machines for quantity production. In this respect Japan is far behind England, the United States and the more progressive continental countries. A few branches of the Japanese industry have begun to use automatic and other special machines for quantity production, and this precedent is being followed by smaller shops, as finances permit.

In woodworking machines the staple types of band, circular and gang saws, planers, etc., form the bulk of the business, although there is some trade in special machines for certain industries.

The Government is the Principal Buyer

The most important buyer is still the government (army, navy, state railways, etc,). The electric, shipbuilding and general machine-building industries also are large consumers of machine tools. Of course, there are numerous other buyers, such as bicycle makers, repairs shops of the big sugar, paper and spinning mills, and many others. The automobile industry is still in its infancy and is likely to be of slow growth. High production cost, a small market and oppressive taxation militate against its success.

The imports of metal-working and wood-working machines in 1920 were valued at 13,650,000 yen (approximately £1,400,000). In addition there is a home industry which in that year produced machines to a value of nearly 10,000,000 yen. The figures for 1921 are not available yet, but doubtless are much below these figures. During the present year, both imports and home production have receded further, as the government is buying little, and only a few of the private industries are prospering.

American and British Exports to Japan

In 1920 the United States sent to Japan 10,964,000 yen (£1,127,-000), and Great Britain 2,573,000 yen (£263,000) worth of machine tools. Imports from other countries were insignificant in 1920, but now imports from Germany are appearing on the market again.

VALUE OF MACHINE TOOLS AND METAL-WORKING MACHINERY EXPORTED TO JAPAN IN 1921

Month		Lathes	Sharpening and Grinding Machines.	Other Machine Tools.	Total of Machine Tools.	All Other Metal-working Machinery.	Total of Machine Tools and Metal-working Machinery
		£	£	£	£	£	£
January	..	19,600	17,980	11,810	49,390	72,700	122,090
February	..	9,230	3,690	20,100	33,020	42,750	75,770
March	..	7,700	957	11,770	20,427	32,800	53,227
April ..	...	8,870	2,970	1,410	13,250	35,280	48,530
May ..	..	2,030	1,990	3,878	7,898	10,210	18,108
June ..	..	98	1,170	14,050	15,318	107,500	122,818
April ,.	..	9,160	1,390	2,290	12,840	13,750	26,590
August..	..	271	1,302	1,440	3,013	7,550	10,563
September	..	1,660	3,280	7,910	12,850	4,400	17,250
October	..	1,405	2,340	3,445	7,190	5,490	12,680
November	..	—	1,690	4,840	6,530	6,940	13,470
December	..	1,846	1,988	5,535	9,369	11,100	20,469
Total	..	61,870	40,747	88,478	191,095	350,470	541,565

Automatic Machine Tools in Japan

By Arthur Jackson, M.E.

THE present industrial depression has come as a blessing in disguise to Japan, causing her to pause and take stock of her manufacturing methods. Engineering firms found themselves confronted by a very formidable foreign competition in manufactured goods of superior quality and cheaper in price, this in spite of the fact that a heavy protective duty has been levied. The question was asked, how is it that foreign countries can successfully compete with Japan in view of the fact that workmen are paid ever so much more than the Japanese and heavy, freights, duty, etc., paid on all imported goods? The answer was not a difficult one, and the Japanese soon learned that America, England and the European powers compelled by the stern necessity of war, equipped their factories with the very latest types of automatic machinery and labor-saving devices. Directly the war ended these enormous industrial plants were changed over from the manufacture of munitions to the manufacture of articles of peace. These products commenced to flow into Japan to the detriment of the home manufacturers. Then the question arose, how are we going to successfully meet this foreign competition ? Shall we raise huge tariff walls so high that foreign products cannot scale them ? It was immediately recognized that there would a great danger in that, as it would shut out the latest foreign inventions, upon which Japan relies to a great extent in her forward march in the civilized world. Wide awake manufacturers realized that to meet foreign competition it was necessary to use the same methods as their competitors or better. To-day the words " Do it automatically " is the motto of every progressive Japanese engineer. Fortunately, many manufacturers have awakened to the fact that the trend of the times requires automatic machinery whenever it can be employed. Instead of installing an automatic machine when the conditions are such that no one could possibly doubt its economic advantage, the Japanese manufacturer usually reverses that progress and takes it for granted that he must specify an automatic unless he can clearly show that it would not pay. When the war ended and it again became possible to purchase automatic machinery from America, some of the leading manufacturers of Japan took advantage of this opportunity and installed batteries of automatic machines in their works, and are now enjoying exceptional prosperity, especially is this so with the leading manufacturers of electrical appliances, bicycles, phonographs, etc.

Following their lead, a large number of other manufacturers have commenced to use automatics and the demand for these machines is now very brisk. It is believed that more automatic machines have been imported into Japan in the last two years than any other type of machine tool.

Not only the largest, but also some of the smallest Japanese firms have installed and are using automatic machines with unqualified success. The most remarkable instance being the Goto Iron Works of Kameido, Tokyo, which is practically a private house and factory all in one. They are so up-to-date that they have ball-bearings throughout their lines shafts. Among their machine tools are to be found three of the latest types of bar working automatics, one of these being a $\frac{7}{8}$-in. Gridley multiple spindle automatic, which was turning out handles for safety razors from brass bars at the rate of 500 per hour, when the writer last visited these works, and on a previous visit they were making brass caps for bicycle valves at the rate of 600 per hour. The largest and most progressive manufacturing firm in western Japan has recently installed an 8-B Potter & Johnston automatic chucking, turning, boring and threading machine, which is believed to be the largest type of fully automatic machine tool now built. It is able to machine a casting or forging of 35-in. in diameter. This machine is also very unique owing to the fact that all its mechanical functions are controlled entirely by compressed air, that is to say, all its speeds and feeds are changed by this means as required by the cutting tools to enable them perform the required functions during their various operations. This particular machine is to be employed in machining aeroplane engine cylinders complete from steel forgings. The attendant's only duty is to place the rough castings in the machine, to take them out when completed, and keep the cutting tools up to their required sharpness.

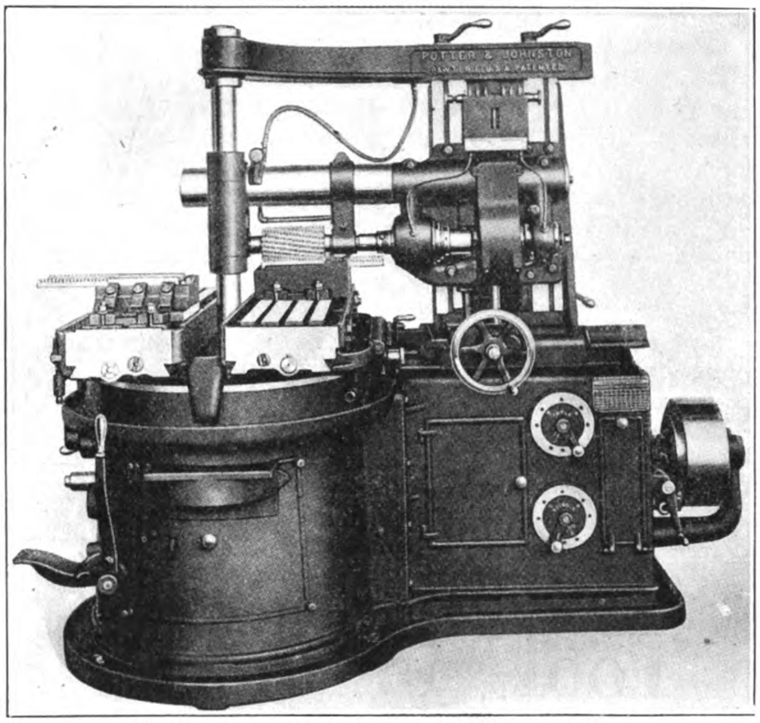


Fig. 1. Horizontal Automatic Milling Machine.

Fatal errors have been and are being made by some of the firms starting up new enterprises by engaging foreign engineers abroad and leaving it to their judgement to select machines for the new factories. These engineers knowing nothing of conditions in Japan, erronously conclude that Japan is not ready for modern methods and chose out-of-date machinery that they would not dream of using in home factories. The result is that instead of these factories making a profit they are hopelessly handicapped from the very beginning. The shareholders are usually called upon to furnish additional funds for new equipment. Often they refuse and the enterprise ends in a failure. The bogie that Japanese, Chinese or other Asiatics cannot work the up-to-date machine tools has been almost entirely dispelled. For the modern automatic machine is not so difficult to set up and operate, as the hand-operated machines of a decade ago, and, what is more, much less skilled labor is required. For only a few skilled men are required to set up these machines for a new class of work, and when this is done, the machines can be left in the charge of mere boys or women to keep them supplied with fresh materials and to take away the finished products. The work is of a much greater degree of accuracy than is possible by the hand method, and each part made is exactly interchangable with another. When we take a look at the Japanese factories at the present time we find that those that are successful and are now making a profit are those who are relying upon automatic machinery, while those who are badly feeling the effects of the depression are those who rely on obsolete hand methods. The Shibaura Engineering Company of Tokyo, now enjoying well-deserved prosperity, have been foremost in installing up-to-date machinery. They now have entire batteries of automatic machines in operation and are gradually replacing all hand work by automatic machinery. The other leading electrical engineering companies are falling into line.

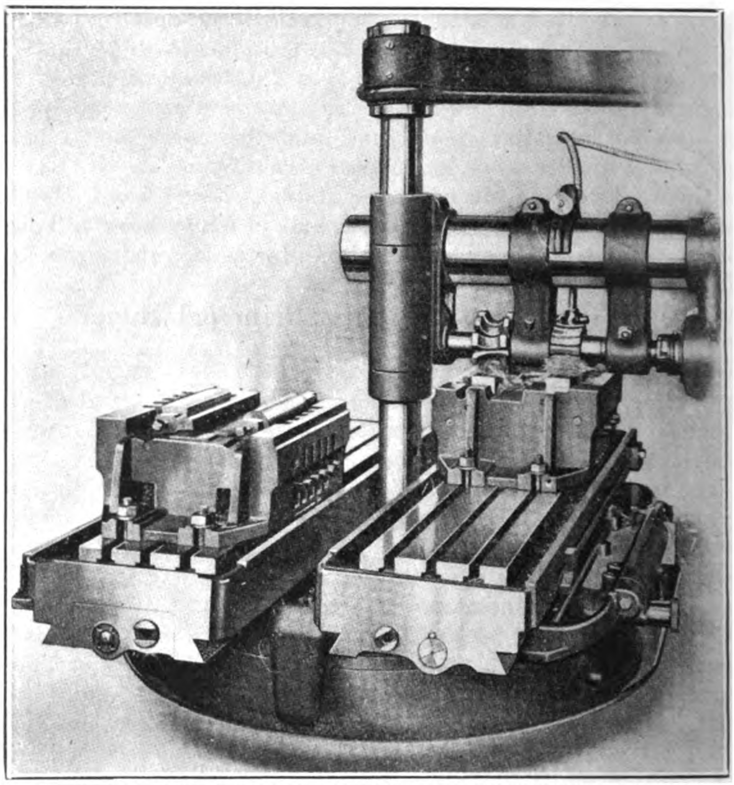


Fig. 2. 2-M HORIZONTAL AUTOMATIC MILLING MACHINE.

Operation Milling radii : 5 pieces held in fixture, making total length of cut $6\frac{9}{16}$ inches. These fixtures are designed to carry two rows of 5 pieces, each row representing a different operation, after the first cut, and the table has revolved to its loading position, the pieces are reversed in the fixture and is then ready for milling the radii on the opposite ends. In this way two operations can be performed without waiting for one operation to be completed.

The writer, who has had considerable experience in pioneer work in connection with the introduction of automatic machinery in various factories of the United States, Canada and Great Britain, experienced a tremendous amount of opposition from the workers in the countries named, he expected the same or more in Japan, and was advised that such would be the case, by people who were in a position to speak with authority on the subject. But contrary to all expectations, he has not had the slightest objection raised by the workers in any of the Japanese factories where he has installed these machines. Instead of opposing the workers have only been too eager to render every assistance to get the machines started, and have always been very keen to try to obtain the very best results. This has been true of workmen in the government factories as well as those in private engineering workshops.

Automatic machines used for general engineering purposes are divided into three distinct classes, i.e., automatic milling machines, automatic chucking machines and automatic bar working machines. The automatic milling machines are again divided into two types. One type has a large turntable on which is mounted two independent work slides. Each slide will take a work fixture in which gangs of articles to be machined are held. The machine is so arranged that the operator can take the finished work off, and put the new work on, one slide, while the work on the other slide is being milled. This machine is able to do the work of two or more of the ordinary types of milling machines. The other type of automatic milling machine has two turntables instead of one, and will take four work fixtures instead of two as on the former type, and not only can all these four fixtures be used for one particular job, but two can be used for one job and two for an entirely different job, and even of different material, so that two distinct jobs can be performed at the same time. This type of machine can thus perform the work of four or more of the usual type of milling machine to be found in engineering factories. The automatic milling machine having one turntable with two work fixtures is known as the 2-M for horizontal and 2-V for vertical work, and the machine with two turntables and four work fixtures is known as the 1-M style. The Potter & Johnston Machine Company have been most successful in introducing such machines in Japan for milling electrical appliances, breech blocks, turbine blades, cycle cranks, etc. Eighteen cycle cranks are held in each fixture at one time, and the total time taken to complete one crank is one and a half minutes. The illustration (No. 1) shows the 2-M machine machining geared racks. The close up view (No 2.) shows the same machine set up to machine radii on machinery steel blocks. Five pieces of work are held in each fixture making a total length of cut $6\frac{9}{16}$-in. The fixtures are designed to carry two rows of five blocks each, each row representing a different operation. After the first cut has been taken, and the table has been revolved automatically to its loading position, the pieces are reversed in the fixture and is then ready for milling the radii on the opposite ends. In this way two operations can be performed without waiting for the other one to be completed.

Engineers will recognize the advantages of using the automatic milling machines as compared to the older types, that demand large floor space, additional labor and other overhead expense.

The Potter & Johnston chucking automatics are built in four sizes, namely, 5-A with 17-in. swing, 6-A having 21 $\frac{3}{8}$-in. swing, 6-B 23-in. swing (vertical) and 8-B with 35-in. swing. These machines are all horizontal type, except the 6-B, which is vertical. The 6-B machines was especially designed for the Ford Motor Car Company of Detroit, U. S. A., and was made vertical to economize floor space. The 5-A size machine is principally used in Japan for the machining of fan motor bodies, cycle hubs, water meters and for numerous other purposes. The machining of fan motors usually takes about four minutes, and the cycle hubs about six minutes on this size machine. The 6-A size is mostly used in Japan for the machining of the end shields for motors from $1\frac{1}{2}$ h.p. to 25 h.p. taking from three to twenty minutes according to the size being machined. These machines are also being used to machine trolley pulleys, trolley wheels, gear blanks, bushings, pulleys, etc. Figure 3 shows a 6-A machine at work machining $7\frac{1}{2}$ h.p. motor end shields in $7\frac{1}{2}$ minutes each, and was taken at the machine tool exhibition held in Osaka last November. This machine was the object of considerable attention from the large number of engineers that attended this exhibition. The close up view (Fig 4) shows the tools used on this job, which included rough and finish facing, rough and finish bore also recessing for oil groves. The limit of error allowed in the boring of the hole was .0005-in. and this limit was easily maintained. In work of this kind the roughing tools are

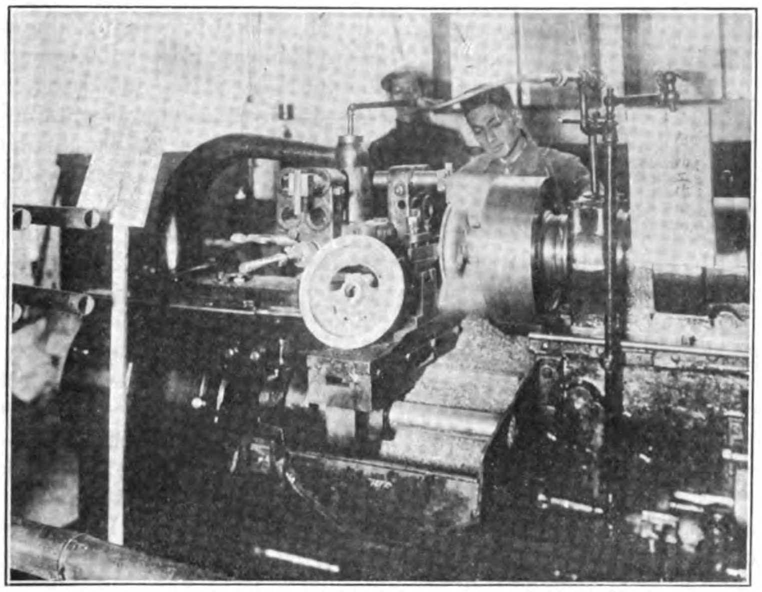


Fig. 3. Automatic Chucking Machine, at work machining $7\frac{1}{2}$ h.p. Motor and Shields in $7\frac{1}{2}$ minutes each

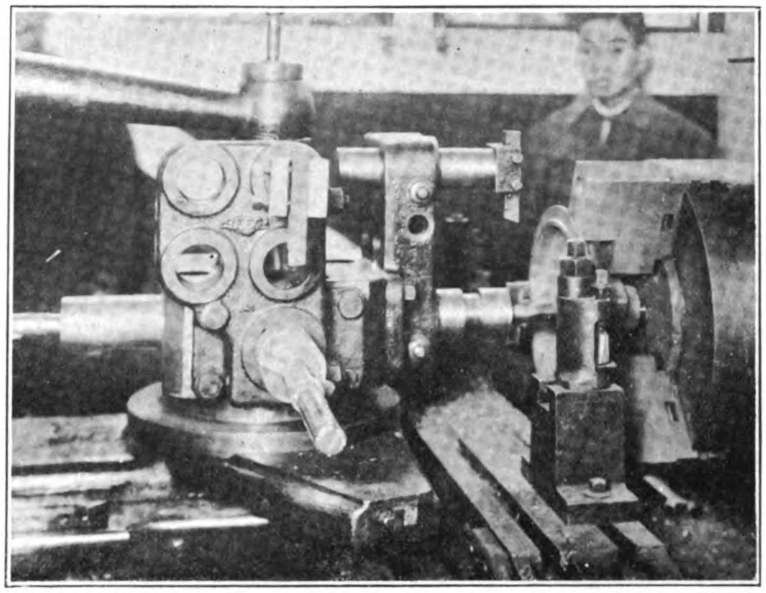


Fig. 4. Close up view of same machine, taken at the Machine Tool Exhibition at Osaka

only sharpened once a day, and the finishing tools usually last a week before they require regrinding. One operator is also able to attend to four machines and sometimes more. The 6-B machine is principally used for naval ordnance work. The 8-B machine which represents the very latest design of automatic machine tool is most suitable for the machining of engine cylinders and car wheel centres, breech blocks of heavy guns, gun carriage hubs, end shields for large motors, etc. In the plant of the General Electric Company at Schenectady, U.S.A., they are machining the end shields for their 50 h.p. motors, which are 28-in. in diameter, on this machine. taking twenty-eight minutes to fully complete each one. This is about a third of the time taken on the boring mills that are generally used on this class of work. The boring mill will requrie one man on each machine, whereas the automatic will only require one man for four machines on this particular job. The foregoing chuck work automatics are so designed so that they will be able to machine up any kind of casting, forging or cut-off bar stock, and will perform any kind of machining operation as may be required, such as turning, drilling, boring, reaming, knurling and threading. When they are to thread outside work it is customary to use automatic self-opening dieheads, and for inside tapping automatic collapsible taps, the turret that carries the die head or tap is so arranged to advance forward at exactly the same pitch as the thread required to be cut.

Tools for drilling, boring or reaming are also held in the turret, which has four or more faces according to the requirements of the work to be done. Tools for facing, or forming are held in the cross

slides on which are both front and rear positions. The front position is generally used for the roughing cuts and the rear cross slide for the finishing cuts. Knurling can be done either on the cross slide or turret as may be most convenient.

Of the bar working automatics used in Japan the Acme multiple spindle, Gridley multiple, and Gridley single spindle automatics are the best known. The multiple spindle machines are used for machining work made from bars of stock from $\frac{1}{16}$-in. up to $4\frac{1}{4}$-in. in diameter, and the single spindle machines for work from 1-in. up to $5\frac{1}{4}$-in. in diameter. The multiple spindle machines have become the most popular of the two classes. These machinse are used for making screws, bolts, nuts, punches, small spindles, safety razor handles, phonograph parts, fountain pens, bullets and a thousand and one other articles that are made direct from rods of iron, steel, brass, vulcanite, etc. These machines are so designed that they carry four bars of material and all cutting tools will work on the four bars at once. The time taken to complete any particular article is the time taken to complete the longest cut, plus the time taken for the machine to automatically index from one position to another, and to feed out the new length of material to be worked upon, and the time to do this is about two seconds or slightly longer according to the size of the machine. These machines as in the case of the chuck work automatics will perform any operation as may be required, and the closest limit of accuracy can be maintained on repetition work that would be inconceivable on hand operated machines.

Automatic machines are far more rigidly built than hand operated machines of like capacity, and this rigidity permits the use of faster speeds and feeds, without destroying the cutting edges of the tools as would be the case with the tools on the less rigid hand operated machines, for the lack of rigidity in the latter machines permits a slight chatter to take place when the tools are cutting and it is this chatter that is more detrimental to the sharp edges of the tools than the actual cutting action.

The Japanese and Manchurian Oil Industry

At a recent meeting of the Union of German Chemists Mr. R. Ockel, of Bonn, read a paper upon the oil industry in Japan and Manchuria, from which the following details are extracted. The Japanese oil industry is, relatively speaking, small and not of much importance, but it is all the more important, in comparison, in Manchuria, which is occupied by the Japanese. This latter covers a superficial area of 456,000 English square miles, or about 2 per cent. times larger than Germany. The exports of soya beans, bean cake and oil have increased from 21,745,000 Haikuan taels in 1912 to 74,000,000 in 1918. The production in 1915 amounted to 108,782,216 bushels, or about 3,000,000 tons of beans, value Y.306,765,849. Of this total about three-quarters were exported, about 30 per cent. in the form of beans and the remainder in cake and oil; the beans went mostly to Japan and China, the oil cake to Japan, and the bean flour to Europe and America. In the Manchurian town of Dairen (formerly Dalny) in 1920 about 4,057 tons beans were pressed daily in sixty mills, yielding 386 tons oil and 3,717 tons cake. In August, 1921, the corresponding figures were 6,000 tons beans and 600 tons oil. At several oil mills at Dairen visited by the German chemist in question, the method of operation is precisely the same; the pre-heated beans, which look like small peas, are passed through a pair of rollers till they acquire the shape of small discs about the size of a farthing and 2 mm. thick; of these, 29.6 kg. are weighed off and spread out upon sackcloth in a 5 cm. thick layer. This cloth is supported by an iron frame, and a nozzle placed below blows steam through it until the layer of bean discs is thoroughly steamed through, so that, even in cold weather (24° C.), such a tropical heat prevails in the chamber that the Chinese workmen do their work absolutely nude, and plunge from time to time into a bath of cold water let into the floor. The steamed beans are thrown into a wooden hoop or ring resting on two annular iron supports resting on a sheet of metal. In this wooden hoop there has first of all been placed a bundle, closed at one end, of a kind of straw-like rushes obtained at high prices from southern China. The warm beans are now stamped down with the bare feet, whilst at the same time the two iron annular supports are pulled upwards so that they encircle the cake with an intervening space of about 3 cm. The empty wooden hoop is now removed by one of the men, and the ends of the rushes are laid centrically over the cake; this latter, with the bottom plate, is then pushed into the preliminary press, from which, when sufficiently compressed, it is transported by two men to the finishing press, where the cakes are laid one upon the other until the press is full, whereupon a pressure of at first 75 and then 150 atm. is applied, and the cakes left under this pressure for from five to six hours. When finished they are about 9 cm. thick and weigh 27.78 kg. About 9 per cent. oil is extracted; it is rendered impure by albumen in solution and 3 per cent. water is absorbed by the cake. At first some difficulty was encountered by Dr. Ockel in refining, due to the albumen in the oil, but these difficulties were subsequently overcome in the course of experiments made at the laboratory at Oimachi, near Tokio, and a very fine edible oil was obtained. In order to remove the albuminous sediment as far as possible, and obtain a uniform product, the South Manchurian Railway Co. erected at Dairen a large "mixed storage tank," into which the oil made in Dairen, as well as that produced throughout Manchuria, can be emptied from the casks; from this tank it can be pumped, after traversing a long zigzag path, by means of electric or steam pumps at a speed of 50 tons per hour to the oil steamers through an 8-in. flexible pipe. Some filter presses have also been erected at the same place. The tank is made of iron; at first a concrete reservoir was used, but the oil was found to be watery. The oil is filled into several cans at a time by an automatic; filling device: when soldered down two of these cans are packed in a case. Besides the three oil mills, Dairen also possesses an extraction plant capable of extracting 170 tons beans daily and securing 15 per cent. oil; of this, 1 per cent. is emulsion, for which only half-price is obtained. 2 per cent. oil remains in the residue, whilst about 4 per cent. is lost with the condensation water and in soluble albumen; this makes a total loss of about 7 per cent. The plant has sixteen extractors, each of three tons capacity. One of the three Dairen oil mills visited hardened their entire production of ten tons. The hydrogen is produced by the filter press process. In Kobe (Japan) there is also a hardening plant, but in Japan fish oil is hardened mostly without any prior refining. At Wakamatsu there is also a bean-extracting plant; it extracts 400 tons oil monthly and secures 15 per cent. oil from the beans. American cottonseed oil presses are used there. The refined oil contains about $\frac{1}{2}$ per cent. fatty acid; 2 per cent. oil is lost by neutralisation, and the preliminary deodorising is effected by drawing off the benzine with a vacuum pump; the oil has a very bad taste. The greatest fault in the handling of the beans, whether by pressure or extraction, in Japan and Manchuria lies in the fact that the residue is used chiefly as a manure and also as a cattle food for the cattle bred for foreigners, as the Japanese do not eat meat or drink milk, living solely on rice, fruit, vegetables and tea. Fat, oil and butter are never eaten. Soya beans are eaten three times daily, namely, as soup in the morning, and in the midday and evening as sauce and in the form of a paste called "Chiang," which is also largely eaten by the Chinese. A kind of custard is also made from it in conjunction with bean albumen; hence, if the beans were as carefully prepared as the cocoa bean, a pressed cake could easily be made of high nutritive value for human consumption, as it contains 45 per cent. albumen, i.e., $2\frac{1}{2}$ times more than is contained in meat. The Japanese have now recognized this fact, and still greater attention is being given to the soya bean as an article of food for starving Europe.

Associated American Chambers of Commerce in China Formed

REPRESENTATIVES of American chamber of commerce located at Shanghai, Tientsin, Peking and Hankow held a meeting in the rooms of the American chamber at Shanghai on October 23 and formed an association representing all American commercial interests in China to be known as the Associated American Chambers of Commerce in China. The delegates to the meeting were: F. J. Twogood, representing Hankow; F. S. Williams and T. E. Simmang representing Tientsin; C. E. Seymour representing Peking and J. Harold Dollar, W. A. Burns V. G. Lyman, J. S. Dolan. A. B. Hykes H. B. Lane and C. B. Arthur representing Shanghai. The board of directors of the American chamber at Shanghai and Lansing W. Hoyt, U. S. trade commissioner, met with the delegates by invitation.

Purpose of Organization

The purpose of the associated American chamber as set forth in the constitution is to consider questions concerning American financial, commercial, manufacturing and shipping interests in China; to communicate through the association the opinion of the American chambers of commerce and affiliated bodies to the American government; to attain by united action such advantages as individual chambers would have difficulty in obtaining separately; and when desirable; to appoint an agent or establish an office in Washington to insure to various members early and reliable information on matters affecting American interests and to facilitate communication between the associated chambers and the American government and public bodies in the United States.

After the adoption of the constitution the meeting considered a number of matters of vital import to American financial, commercial and general interests in China. Among the subjects discussed which later were the subject of resolutions, are: American investments in China; China and world financial readjustment; China's defaults upon American loans and other governmental obligations; the special tariff conference; co-operation with an American protective Committee that has been organized in Peking; the China trade act; American consular, diplomatic and commercial attaché services in China; harbor improvements and regulations for Shanghai, Tientsin, Canton, Tsingtao and other ports; American consular property in China; American personnel in Chinese government services; postage rates between China and the United States; disorder in China; depreciated copper currency; exchange of news between America and China; American Yangtze river patrol; application of rule one of the Chinese customs duties and the imposition of illegal and burdensome surtaxes and other restrictions on trade by the Chinese governmental and provincial officials.

Mr. J. HAROLD DOLLAR
President, American Chamber of Commerce of Shanghai

Hoover's Investigation Committee

Although the resolutions adopted have not yet been drafted in form for publication and circulation to the members the subject of American investments in China and other financial matters received considerable attention. Gratitude was expressed at the appointment of a financial investigation committee by Secretary Hoover a few days ago and the associated chambers voted to give this committee full co-operation in making investigations and in carrying out its work to the end that American investments in China may be protected and placed on an even footing with those of other nationals. On the subject of China and world financial readjustment it was the sense of the meeting that, in case the United States called a general financial and economic conference for the purpose of readjusting European and world finance, China be included in such a conference and that the status of China be considered as a part of any scheme for world financial rehabilitation.

Considerable attention was paid to the special tariff conference which is expected to meet in Peking next spring and a resolution passed urged upon President Harding the importance of appointing "the strongest possible commission from the standpoint of personnel and technical skill, men with a thorough knowledge of China's treaties and commitments, to the end that American interests in China may be protected, the open door fully maintained, and American investment and obligations in China be placed on an absolutely equal footing with those of other nationals." The association took a strong stand on the subject of China's defaults upon American loans and government debts for equipment purchased and passed a resolution depreciating the effect of these defaults upon American trade and China's credit in the United States. The American government was urged to take the necessary steps to see that American interests in this regard be not discriminated against.

Several of the matters discussed were of interest outside of the commercial community, especially one dealing with the need for fuller and better American news reports in China. The American government was urged to take action extending to China the present low wireless rates for news messages now in existence between America and the Philippine Islands. Another action recommend the immediate negotiation of a reciprocal postal treaty between China and the United States whereby domestic postage rates may be made to apply similar to a treaty now in existence between China and Japan and between America and Great Britain.

Japanese Electrical Notes

KUMAMOTO ELECTRIC TRAMWAY.—On May 16, 1922, the Kumamoto Densha K.K., organized in November, 1921, with a capital of Y.3,000,000 was registered. The object of this company is to construct an electric railway within and around the city of Kumamoto, and to engage in freight and passenger transportation. The main office of the company is at 46 Kenya Ima Machi, Kumamoto city.

SAKU SUWA ELECTRIC TRAMWAY.—On May 10, 1922, the Saku Suwa Denki Tetsudo K.K. was established with the object of constructing an electric railway and engaging in transportation in Nagano prefecture. The capital is Y.5,000,000, of which one-tenth is paid up. Its main office is 2,360 Kyowa Mura, Kita Saku Gun Nagano prefecture.

TOSA ELECTRIC TRAMWAY.—The Tosa Denki Tetsudo K.K., recently licensed, and the Tosa Suiryoku Denki K.K., have agreed to amalgamate. The new company will be capitalized at Y.6,000,000; the president is Mr. Tomoshiro Uda.

GUNMA ELECTRIC CO.—The Kanai power plant of the Gunma Denryoku K. K., under construction on the Agatsuma branch of the Tone Gawa, and the transmission lines to the Kawasaki transformer station in Kanagawa prefecture are almost completed. This new plant will generate 10,800 kilowatts at ordinary stages of water, and 7,800 kilowatts when the water is low. The Keihan Denki Tetsudo K. K., the Fuji Gasu Boseki K. K., and the Japan Steel Works, Ltd., have contracted for the power. It is also reported that the Gunma Company has decided to purchase the light and power business of the Keihan Denki Tetsudo K. K. at a cost of Y.5,500,000.

HIROSHIMA GAS AND ELECTRIC RAILWAY CO., LTD.—Capitalized at Y.10,000,000 and the Otagawa Hydro Electric Co., Ltd., have decided to amalgamate under the name of the Hiroshima Denki Tetsudo Gasu K. K. (Hiroshima Electric Railway and Gas Co. Ltd.)

NEW HYDRO-ELECTRIC ENTERPRISE.—Kinkichi Muto and several others plan to construct a 5,500 kilowatt power plant on the upper stream of the Agatsuma branch of the Tone Gawa, with a capital of Y.2,000,000. The cost of constructing the power plant is estimated at Y.2,800,000, the work to be finished by the end of 1923. When completed, a second plant to generate 10,000 kilowatts will be constructed at an estimated cost of Y.4,370,000, on the same river. Preparations for work are under way. The power generated by these plants will be sold to the Tokyo Electric Light Co., Ltd.

CAPITAL INCREASE OF ELECTRIC COMPANIES.—Chichibu Tetsudo K. K. (Saitama prefecture) registered increase to Y.3,000,000 ($\frac{1}{10}$ paid up) on May 27, 1922.

Ehime Suiryoku Denki K. K. registered on May 23, 1922 to Y.3,000,000 ($\frac{1}{4}$ paid up).

Ihigawa Denki K. K. (Gifu prefecture) to Y.8,500,000 (all paid up) by Y.1,500,000 as a result of the amalgamation with the Yoro Tetsudo Kabushiki Kaisha. The capital increase was registered on July 1, 1922.

Hokkaido Denki Tetsudo (Hokkaido) registered on July 6, 1922 to Y.5,000,000 ($\frac{1}{10}$ paid up).

Sobu Denryoku K. K. (Kanagawa prefecture) registered on May 27, 1922, to Y.4,850,000 ($\frac{1}{4}$ paid up) as a result of amalgamation with the Zushi Dento K. K.

Kumamoto Denki K. K. (Kuamoto prefecture) registered on May 18, 1922, to Y.13,000,000 ($\frac{1}{4}$ paid up) as the result of Midorikawa Denryoku K. K.

Samekawa Denryoku K. K. (Tokyo prefecture) to Y.2,000,000; registered, June 27, 1922. Keihan Denki Tetsudo K. K. (Osaka prefecture), registered on August 5, 1922, to Y.11,520,000 (all paid) as a result of amalgamation with the Wakayama Suiryoku Denki K. K. on July 24, 1922.

Nagoya Tetsudo (Aichi prefecture) was licensed on August 19, 1922, to extend the electric of the company, gauge 3-ft. 6-in., between Biwajima-machi, Kasugai-gun, Aichi prefecture, and Sasajima-machi, Nak Ku, Nagoya city, Aichi prefecture, a distance of 1 mile 70 chains. The cost of construction is estimated at Y.1,300,000.

THE TOMI-IWA TETSUDO (Toyama prefecture) was licensed on September 2, 1922, to construct an electric railway with a gauge of 3-ft. 6in. between Ushijima, Toyama city, Toyama prefecture, and Higashi Iwase-machi, Shinkawa-gun, Toyama prefecture, a distance of 4 miles 10 chains. The estimated cost of construction is Y.600,000, chief promoter Kinjiro, Kato.

Osaka Electric Light Co.: of the two power plants at Kasugade of this company, each 25,000 kw., one has been completed and opened to business at the beginning of September, 1922.

Yahagi Hydro-Electric Company: of Aichi prefecture, has completed a new 2,800 kw. plant at Oshiyama, which will transmit power over the lines of the Daido Denryoku K. K., to the Tohoku Denryoku K. K.

In order to complete this plant the unpaid portion of Y.10,000 on the Yahagi shares have been called up. The total capital is now Y.5,750,000, and there is Y.1,500,000 of loans outstanding.

This gives the Yahagi Suiryoku K. K., a total power capacity of 15,800 kilowatts. The president of the company is T. Inouye; managing director, E. Sugiyama.

UJIGAWA ELECTRIC COMPANY.—On June 26, 1922, at an extraordinary meeting of the shareholders of the Ujigawa Electric Company held in Osaka, the following measures were approved :—

(1) Merger with Kumano Denki K. K., approved and a capital increase of Y.1,050,000 authorized to cover the purchase. (2) Merger with Taisho Suiryoku Denki K. K., approved and a capital increase of Y.2,666,650 authorized to complete the transaction.

In addition, it was decided to increase the outstanding capital by Y.43,633,350 in order to complete the construction plans now approved. As a result, the total capital of the Ujigawa Denki K. K. is raised to Y.85,000,000. The number of shares issued amounts to 1,700,000.

NEW POWER PLANT, OSAKA.—The electric railway bureau of the Osaka municipality owns the No. 2 a power plant, at Kujo in Osaka city. In August, 1921, construction was commenced on a new plant, the building for which was completed in April, 1922, at a cost of Y.400,000. A canal is ow under construction at a cost of Y.290,000. Machinery consisting of 15 boilers and two generators with a capacity of 10,000 kilowatts each is being installed. Both generators will be in operation this year. At present, 9,000 kilowatts are ready for use but will be held in reserve of the regular supply. Of the 20,000 kilowatts which will be generated on completion of this plant, 10,000 will be used to operate the city electric car lines, 2,000-3,000 kilowatts taken by the Shibashima Water Works Intake, and the balance sold to private consumers.

WAKAYAMA HYDRO-ELECTRIC POWER PLANT.—Because of the lack of water in winter, the supply of power in Wakayama prefecture is materially decreased each year to the injury of industries using electric motors. For instance, the Wakayama Suiryoku K. K., which recently combined with the Keihan Bentetsu K. K., stopped operations every other day last winter and the Kishu Flannel Manufacturing Co. was badly hit.

To remedy this situation, the prefectural government has determined to enter the field, and furnish power to the existing industrial concerns at cost. Prefectural finances however, are as yet inadequate to cover the cost of construction, so actual building operations are delayed.

The river Shingu, Hitaka, and Arita have been surveyed for sites. The upper stream of the Arita river at Otaki and Hanazono will be used for power, and construction of plants will be commenced in 1923, it is reported, plans are perfected and bids for work will shortly be entertained.

CABLE CARS FOR MT. FUJI.—Risaburo Kuki, a business man of Numadzu, has promoted a company called the Fuji Kaku Sakudo K. K., with a capital of Y.1,000,000, to build an electrically operated aerial cable line from the eighth station on Mt. Fuji, on the Gotemba Side (about 10,000 feet above sea level), to the summit of the mountain (12,365 feet), a total distance of 1.7 miles. The cost is estimated at Y.150,000. It is planned to open business next year.

KANSAI ELECTRIC COMPANY.—On June 26, 1922, at the general shareholders meeting of the Kansai Denki K. K., it was decided to purchase the Yamashiro Suiryoku Denki K. K., the Hokusei Denki K. K., the Aiki Denki Kogyo K. K., the Toki Suiryoku Denki K. K., the Kyushu Dento Tetsudo K. K., the Yawata Suiryoku Denki K. K., the Bishu Denki K. K., and the Nagoya Gas Company.

Profits for the first business term of 1922 were Y.6,896,307, of which Y.500,000 was set aside for redemption of loans. Surplus carried forward from the previous term amounted to Y.91,373. A dividend at the rate of 13 per cent. per annum was allowed for the term leaving Y.98,698 to be carried forward as surplus to the next term of business.

Owing to the amalgamation of the Kyushu Denki Tetsudo K. K., the name Kansai Denki (the Kansai is the district around Osaka, Nagoya and Kobe), was no longer appropriate to the company. The name has accordingly been changed to To Ho Denryoku K. K., and the main office of the company transferred to Tokyo. Branch offices are to be maintained at Nagoya, Gifu, Nara, Yokkaichi, Shimonoseki, Fukuoka, Kurume, Omuta, Saga, Nagasaki and Saseho.

NEW ELECTRIC MACHINERY COMPANIES: YOSHIWADA SHOTEN, KABUSHIKI KAISHA.—Main Office. 4 Sojuro-machi, Kyobashi Ku, Tokyo city. Business: Sale and purchase of electric and other machinery. Contracting, manufacture of electrical supplies. Established: June 1, 1922; Capital: Y.300,000; Paid up: Y.75,000; Representative Director, J. Yoshiwada.

MATSUNO SHOTEN, KABUSHIKI KAISHA.—Main office: 5 Matsushita Cho, Kanda Ku, Tokyo City. Business: Chemical and surgical apparatus, manufacture and export. Manufacture and sale of drugs and general chemicals. Manufacture of glass, electrical machinery and supplies. Sale of meters. Established: June, 1922; Capital: Y.60,000, paid up: Y.24,000; Representative director, K. Wada.

Taika Kogu Kabushiki Kaisha (Taika Engineering Tools Co., Ltd.) Main office: 2 Kotohira Cho, Shiba Ku, Tokyo. Business: Machine tools, and electric machinery; Manufacture and sale. Also to sell products of Taika Denki Yakin Koshi. Established: May 27, 1922; Capital: Y.100,000 all paid up. No. of shares: 4,000; Director, K. Uyeshima.

DAI NIHON DENKI K. K.—Main office: No. 28 Udagawa Machi, Shiba Ku, Tokyo City. Business: Supply of electric machines and material, Contractors for electric works; Established: June 15, 1922; Capital: Y.50,000, paid up: Y. 12,500: Rep. Director, T. Takei.

TAIWAN DENRYOKU K. K.—In 1921 the Taiwan Electric Power Co. planned to issue bonds to the value of Y.30,000,000, but only half of that amount was floated. The balance cannot be raised at this time because of the tight financial market. Part of the company's plans have therefore been abandoned, and work stopped. The initial construction plans will not be completed until 1925.

YAMAGUCHI PREFECTURAL ELECTRIC WORKS.—The Yamaguchi prefecture government is constructing a power plant on the Nishiki river. With low water, the power generated will be 1,194 and at ordinary stages, 3,356 kilowatts. The canal will be 4,152 *ken* (*ken* is 6 feet), of which, 3,957 *ken* will be tunnel work. The dam will be 69 feet high. The quantity of water will be 50 gallons per second at low stages, and at ordinary stages 152 gallons. The effective fall at low stages is 383 feet, at ordinary, 397 feet. The theoretical H.P. at low water is 2,130 H.P. at ordinary stages 5,982 H.P. The contract cost of construction is Y.182,000.

SHOKAWA SUIRYOKU KAISHA.—The Shokawa Hydro-Electric Co. has commenced work on a new power plant at Inami-machi, Toyama

prefecture, to generate 54,000 kilowatts. The company is capitalized at Y.10,000,000.

KUMAMOTO CITY WILL MUNICIPALIZE ELECTRIC LINES.—The Kumamoto Denki Kaisha has been operating electric tram lines in the city of Kumamoto, but in November last a new company called the Kumamoto Densha K. K., was established to construct tramways in the streets of that city. An understanding existed between these two companies and the authorities about municipalization, and on July 25 a purchase plan was approved by the city assembly, the principal terms of which are: (1) The city will take over the property of the companies as from June 30, 1922. (2) The city will deliver within six months city bonds for Y.750,000, bearing interest at 6 per cent. (3) The companies will buy Y.820,000 of city bonds bearing interest at 7 per cent.

OMUTA ELECTRIC TRAMWAY CO.—This company was planned, in 1917, with a capital of Y.280,000 but a license was not granted until June 24, 1922. On July 16, a meeting was held to establish the company.

The line to be built will connect Omuta city and Mikawa-machi, Miike-gun, Kumamoto prefecture, a distance of 2 miles and 42 chains, single track. After this line is finished, the capital will be increased to Y.3,000,000 and other lines will be built from Miike-machi to the Toda station of the imperial government railways. The officers of the company are: Managing Director, T. Masuda; Directors, K. Matsumoto, T. Tominaga, T. Yamaguchi and T. Nagami.

FUJI SUIRYOKU DENKI K. K.—The Fuji Suiryoku Denki K. K. at an extraordinary meeting of its shareholders on July 20, 1922, approved the purchase of the Sagami Denryoku K. K. Capital was increased to Y.34,860,-000 from Y.33,860,000.

NEW LINE BETWEEN TOKYO AND YOKOHAMA.—A new company called the Tokai Kido K. K. (Tokai Tramway Co., Ltd.) has been organized with a capital of Y.20,000,000 to construct and operate a line between Tokyo city, Shiba Ku, Shibaguchi, and Yokohama city, Yoshida Bashi, Isesakicho, a distance of 18.3 miles. The line will run through city streets for three miles along national roads for 13 miles, and will build 2½ miles of new roads for its right of way. This company has agreed to bear part of the expense of reconstructing the national road between Yokohama and Tokyo.

AZUMAGAWA DENRYOKU K. K.—A new electric power company to be capitalized at Y.8,000,000 and called the Azumagawa Denryoku K. K., has been promoted by Mr. T. Shirai, and other members of the staffs of the Tokyo Dento K. K. and the Katsuragawa Denryoku K. K. All the power will be sold by special contract to the Tokyo Dento. Of 160,000 shares, the Tokyo Dento will take 20,000. Power plants will be built on the Azumagawa, at Imai, Nishikubo, and at Haneo in Gunma prefecture. The canal will be 5,125 *ken* long and the fall 570 feet. About 26,447 H.P. will be generated.

EIHIJI TETSUDO K. K.—A license was issued to the Eiheiji Tetsudo K. K. on July 28, 1922, to construct an electric railway line between Shimo Shihi mura, Yoshida-gun, and Shibiya-mura, Yoshida-gun, in Fukui prefecture, a distance of 3 miles 26 chains. The cost of construction will be Y.350,-000.

OSAKA KIDO K. K., NEW LINES.—The departments of railways and home affairs on July 28, 1922, approved a license to the Osaka Kido K. K., to build two new lines: (1) An electric line between Kuromoncho, Higashi Ku, Osaka city and Fuse-mura, Naka Kocki-gun, Osaka prefecture, (2) Extension of line from Tenma Bashi Suji, 4 chome, Kita Ku, Osaka city, to Koshae-mura, Naka Kocki-gun, Osaka prefecture.

ARIMA DENKI KIDO K. K.—On July 5, 1922, a license was granted to the Arima Denki Kido K. K., to construct a railway between Kawatsura, Obama-mura, Kawabe-gun, Hyogo prefecture, and Arima-machi, Arima-gun, Hyogo prefecture.

IZUMI DENKI KIDO K. K.—This company was licensed July 7, 1922, to build a line between Hamadera-machi and Sano-machi, Osaka perfecture. A new license was granted for a line between Hamadera-machi to Imamiya-machi, in the suburbs of Osaka city.

KONAN DENSHA KIDO K. K.—On July 7, 1922, a license was issued to the Konan Dansha Kido K. K., to construct an electric railway between Ashiwara-machi, Nanba, Minami Ku, Osaka city, and Tsukisu, Ebisu, Sakai city, Osaka prefecture.

IKOMA TOSAN KOSAKU TETSUDO K. K.—A license was granted on July 7, 1922, to the Ikoma Tosan Kosaku Tetsudo K. K., to construct an electrc railway line between Ishikiri, Oto-mura, Naka Kochi-gun, Osaka prefecture, and Tsujikogoe, Otom-mura, Naka Kochi-gun, Osaka prefecture, 1 mile 68 chains, gauge 3 feet 6 inches, at an estimate cost of construction of Y.400,000. The Osaka Kido is also operating in this district.

JOTO DENKI TETSUDO K. K.—On July 7, 1922 a license was grantpe to the Joto Denki Tetsudo K. K., to build an electric railway between Nakahon-machi, Tose-gun, Osaka prefecture and Oto-mura, Naka Kochi-gun, Osaka prefecture, 6 miles 35 chains, gauge 4 feet 8½ inches. The cost of construction is estimated at Y.1,500,000. This line will connect with the Ikoma Tosan Kosaku Tetsudo K. K.

TO USE CONCRETE POLES.—Because of typhoons, the Tokushima Suiryoku Denki K. K. has suffered much damage to its poles, and has been decided to substitute 50 feet steel concrete poles for all wooden poles now standing, at a cost of Y.500,000.

POWER FROM CITY REFUSE.—The Osaka sanitary bureau has conductad investigation into the burning of the city refuse for the purpose of producing electric power and gas. In the budget for 1923-24 items will be included covering the construction of two plants to handle these matters. Work will be commenced on the electric power plant, with a capacity of 1,500 kilowatts.

IZUMO DENKI MERGER.—The Izumo Denki K. K., on July 5, 1922, decided to purchase the properties of the Hamada Denki K. K., increasing its capital of Y.9,500,000, by Y.1,000,000 to cover the transaction. A short time ago this company purchased the Chugoku Denki K. K., and at the same time the Onsentsu Dento K. K., capitalized at Y.150,000, was also bought up. The mergers will take effect on September 1, 1922, and practically monopolizes the power supply in the Izumo district, of Shimane prefecture, in the hands of the Izumo Denki K. K.

NEW KYOTO-OSAKA RAILWAY.—The Keihan Denki Tetsudo K. K. (Osaka-Kyoto Electric Ry. Co., Ltd.) was recently authorized to construct a new line between Osaka and Kyoto. In order to separate the business of its present line and the new line, a subsidiary corporation, called the Shin (New) Keihan Denki Tetsudo K. K., capitalized at Y.25,000,000, was organized to construct and operate the new line.

On July 28, 1922, the officers of the company were elected, and work especially on the important section entering Osaka city, is to begin at once. The officers elected are: President, K. Okazaki; Managing Director, K. Ota; Directors, K. Watanable, T. Murai, N. Nagata, S. Inouye and S. Ono. Auditors, K. Hamaguchi, Y. Shimamura and S. Yuasa.

COMPANY'S RAILWAY LINES.—The Musashi Hydro-Electric Co. owns several steam and electric railways lines. In order to separate the business of transportation from that of power and light supply, a new company called the Musashi Tetsudo K. K. (Musashi Railway Co. Ltd.) has been promoted by Viscount Shibusawa.

The new company will purchase the transportation enterprises of the Musashi Hydro-Electric Power Co., which include 65 miles lines in operation and several lines licensed to be built. The new company will electrify all the lines. It is capitalized at Y.6,000,000 in 120,000 shares, half be taken by the promoters, the other half offered to the public.

TEIKOKU DENTO K. K.—The Teiko Electric Light Co., Ltd., has been very active of late in effecting amalgamations with smaller electric lighting concerns and its capital of Y.25,000,000 will be doubled.

Japanese steamers equipped with wireless, in July.

GYOKO MARU.—Owned by Yamashita Kisen Kaisha; Call J H Q A: Apparatus installed; Nippon Radio Co., momentary spark type.

TOKO MARU.—Same owner; Call J H. R. A; Apparatus; same.

HOKKO MARU.—Same owner; Call; J H W A; Apparatus, Dept. of Communications, quenched spark type.

MOJI MARU.—Owned by Nippon Yusen Kaisha; Call J. I R A; Apparatue Installed; Dept. of Communications, quenched spark type.

KAIKO MARU.—Owned by I. Kuzuhara, Call; J H S A; Apparatus Installed; Nippon Radio Co., momentary spark type.

HAYATORI MARU.—Owned by Department of Agriculture and Commerce; Call J H Y; Apparatus; Dept. of Communications, ordinary spark type.

KYOSEI MARU.—Owned by Kyosei Kisen K. K., Call J H T A; Apparatus Installed; Dept. of Communications, quenched spark type.

EIKO MARU.—Owned by Nippon Yusen Kaisha; Call J H U A; Apparatus; Dept. of Communications; quenched spark type.

AWAJI MARU.—Same owner; Call J H V A; Apparatus; same.

MENADO MARU.—Owned by Osaka Shosen Kaisha; Call J H X A; Apparatus installed; Dept. of Communications; quenched spark type.

CHOSA MARU.—Owner Same; Call J H Y A; Apparatus; same.

ELECTRIC MERGER.—The Iwaki Denki K. K., of Komogome, Higashi Katamachi, 137 Hongo Ku, Tokyo city, operating an electro-chemical plant in Fukushima prefecture, will amalgamate with the Itoyo Suiryoku Denki K. K., whose main office is at 146 Yahata, Itoyo-mura, Tamura-gun, Fukushima prefecture.

ELECTRIC FANS IN TOKYO, 1922.—The Tokyo Electric Light Co. states that on July 10, 1922, it was furnishing power for 45,000 electric fans in the city of Tokyo. Compared to 1921 this is an increase of 20 per cent. More than 99 per cent. of the fans are 12 inch types. The electric bureau of the Tokyo municipality, according to an investigation of July 10, 1922, supplied power to 4,668 fans in 4,241 homes. These were also mainly of the 12-inch types.

TAMAGAWA TO BE EXPLOITED.—The water power of the upper Tama near Tokyo has for a long time been the object of much competition between rival power interests. A license has been granted a private company, promoted, it is said, by twenty conflicting power interests. A company capitalized at about Y.10,000,000 is now being actively advertised. At low water the head in this river is from 200 to 250 gallons a second, and 10,000 H.P. can be generated.

NEW HYDRO-ELECTRIC PLANT.—The Kanto Suiden K. K. plans building a power plant on the shore of lake Ose in Fukushima prefecture. From this lake the Tadami river takes its rise, and flows through Fukushima prefecture. The lake is bordered by deep forests, and is little visited.

The plan is to build a reservoir from which the water will fall 3,000 feet to the generating station. Such a fall is a rarity in Japan, and 45,000 H.P., can be generated at this new plant.

ATMOSPHERIC NITROGEN PLANT.—The Suzuki Shoten, of Kobe, will erect an atmospheric nitrogen fixing plant at Hikoshima in the suburbs of Shimonoseki. The survey of the site has been completed, but the plans are kept in the most profound secret. It is reported, however, that the plant will produce ten tons of nitrogen a day, and 1,000 tons of fertilizers. The plant will be of the French type.

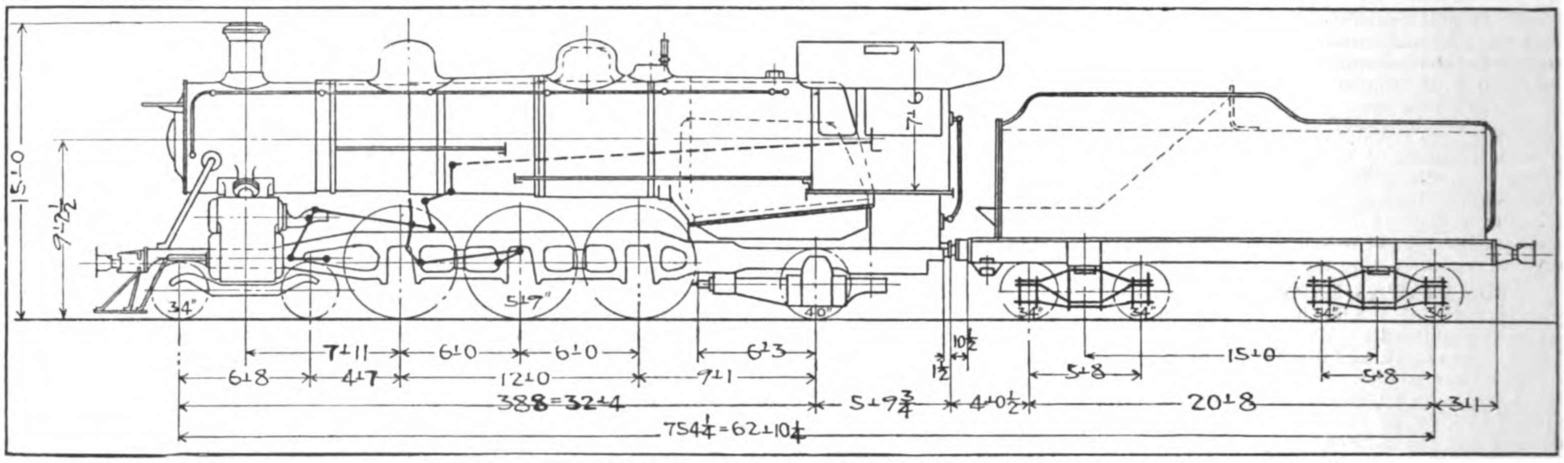
YOKOHAMA ELECTRIC RAILWAYS EXTENDED.—The Yokohama municipal electric bureau will commence construction on the third part of its track extension program. A loan of Y.3,950,000 has been approved to cover the costs.

ELECTRIC TRAMWAY MERGER.—The city of Nagano, and the town of Yoshida in Nagano prefecture, will combine their plans for the construction of an electric railway between the two places, to be later extended from Yoshida to Sasaka. The line will cost Y.250,000 and is to be completed by July 1923.

Japanese Locomotives for Chinese Railways

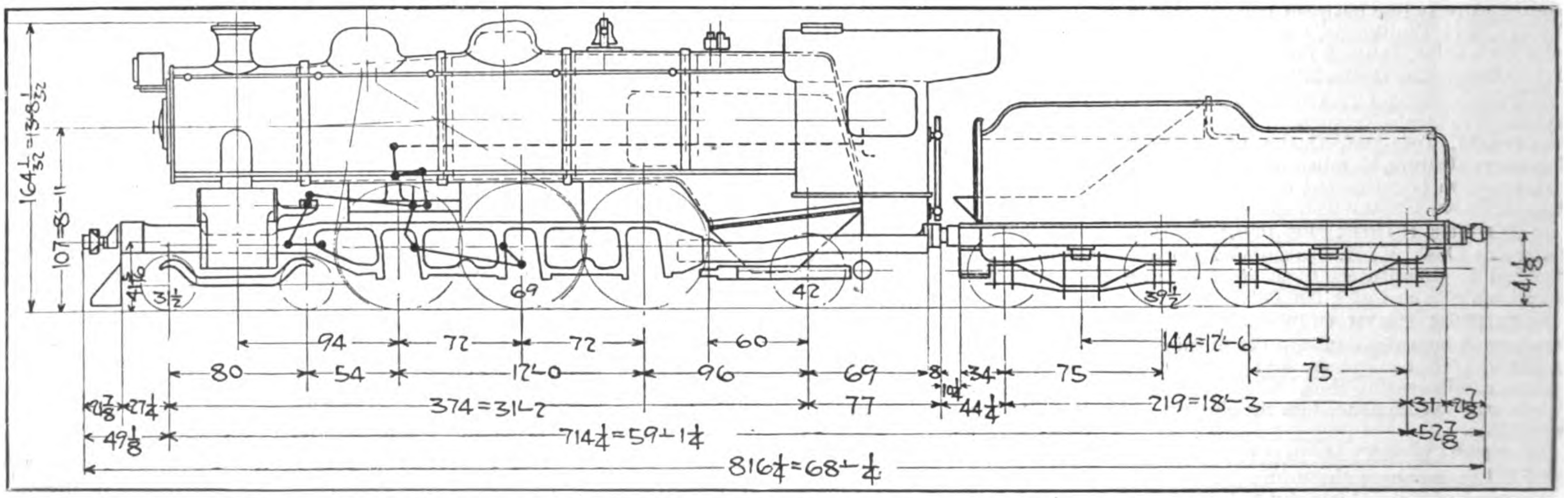
ONE of the first orders for standard gauge locomotives for service on Chinese railways placed with Japanese manufacturers was secured by the Kisha Seizo Kaisha of Osaka. This company was entrusted with building two of the 4-6-2 type of tender locomotives recently ordered by the Shantung railway administration in addition to a further order from the South Manchuria Railway for its Chosen lines. The Kawasaki Dockyard also received orders for several of the same type of locomotive. The Kisha Seizo Kaisha has specialized in the manufacture of locomotives since its organization and with the extension of its plant during the war it has devoted more and more attention to the possibilities of the export market in Eastern Asia, and is now prepared to construct standard gauge rolling stock.

Foreign engineers who have inspected the works and its products frankly state that these not only compare favorably with locomotives made in Europe and America, but in some particulars they possess distinct advantages. Many of the finest and most powerful engines in operation on the imperial government railways have been turned out at the Osaka works of this company. In addition, passenger and freight cars of all types and sizes are manufactured for the domestic narrow gauge railways and electric tramways, while standard gauge cars have been built for the



4-6-2 Type Tender Locomotive with Superheater made by the Kisha Seize Kaisha for the Chosen Lines of the South Manchuria Railway

			Working Order	Empty
Gauge of Track	4′ 8½″	Weight on Leading Truck ...	43,500	
Dia. of Cylinder by Stroke	24″ × 26″	„ „ Trailing Truck ...	40,000	
Working Pressure	180 lb/sq. in.	„ „ 1st Driving wheel	„	
Grate Area	46.9 sq. ft.	„ „ 2nd „	„	
Total Heating Surface...	3,055 „ „	„ „ 3rd „	„	
Super „ „	600 „ „	Total Weight on „	120,000	
Evaporative Heating Surface Total ...	2,455 „ „	„ „ of Engine ...	203,500	184,000
„ Tube	2,262 „ „	Weight on 1st Tender wheel	31,500	
„ Fire Box	165 „ „	„ „ 2nd „ ...	„	
Arch Tube	28 „ „	„ „ 3rd „ ...	„	
Dia. of Boiler (out of 1st Ring) ...	5′ 6″	„ „ 4th „ ...	„	
Large Smoke Tube (Dia. Leng. × No.)	5⅜″ × 18′ 2 × 26	Total Weight of Tender	126,000	48,000
Small Smoke Tube (Dia. Leng. × No.)	2″ × 18′ 2″ × 168	„ „ Engine & Tender	329,500	
Boiler Water		Maximum Width	10′ 6″	
Capacity of Tank	800 cub. ft.	Tractive Power = $\frac{185\ Pd.^2 S}{D}$ =	332,000-lbs.	
Fuel Carried	280,000-lbs.			



4-6-2 Type Tender Locomotive with Superheater for the Shantung Railway, made by the Kisha Seizo Kaisha

Korean and Manchurian lines. The shops are equipped to make cars for any gauge of line.

The powerful locomotives built by the Osaka works employed on the Abt railway over the Usui pass of the Shin-Yetsu line of the government railways, have called forth unstinted praise and admiration from engineering circles.

The annual manufacturing capacity of the Osaka works is 120 locomotives, 1,500 steel freight cars, 8,000 tons of bridge beams, 250 various machine tools and about 10,000 h.p. of the Takuma water tube boilers. The capacity of the Tokyo Works is 250 bogie passenger coaches, 2,500 freight cars and 1,000 switch stands. In addition to the Honju works a Tokyo, the company operates another branch works in Tokyo at Higashi Hirai-machi, in Fukagawaku.

Gauge of Track	4′ 8½″
Dia. of Cylinder by Stroke ...	20″ × 26″
Working Pressure	200 lb/sq. in.
Grate Area	38.2 sq. ft.
Total Heating Surface...	2,232 ,,
Super ,, ,, ...	470 ,,
Evaporative Heating Surface Total...	1,762 ,,
,, Tube	1,582 ,,
,, Fire Box	180 ,,
Dia. of Boiler (out of 1st Ring) ...	5′ 3 3/16″
Large Smoke Tube (Dia. Leng. × No.)	5⅝″ × 16′ 0 × 22
Small Smoke Tube (Dia. Leng. × No.)	2″ × 16′ ″0 × 130
Boiler Water	270 cub. ft.
Capacity of Tank	680 ,,
Fuel Carried	160,000-lbs.

	Working Order	Empty
Weight on Leading Truck ...	40,000-lbs.	lb.
,, ,, Trailing Truck ...	35,000 ,,	,,
,, ,, 1st Driving wheel	35,000 ,,	,,
,, ,, 2nd ,, ...	35,000 ,,	,,
,, ,, 3rd ,, ...	35,000 ,,	,,
Total Weight on ,, ...	105,000 ,,	,,
,, ,, of Engine ...	180.000 ,,	163,000 ,,
Weight on 1st Tender wheel	,,	,,
,, ,, 2nd ,, ...	,,	,,
,, ,, 3rd ,, ...	,,	,,
,, ,, 4th ,, ...	,,	,,
Total Weight of Tender ...	105,000 ,,	474,000 ,,
,, ,, Engine & Tender	285,000 ,,	210,400 ,,
Tractive Power = $\frac{185 \text{ Pd.}^{2} S}{D}$ =	256,000-lbs.	

First Jap Warship With Electric Drive Stands Sea Trial

General Electric Company Equipped "Kamoi" Which Sails for Japan Soon

THE first vessel of any navy other than that of the United States to be equipped with the electric drive, the Japanese fuel ship *Kamoi* was pronounced recently by representatives of the Japanese imperial navy and by electrical men to have successfully stood the tests applied during the builders' sea trials on Thursday off the Delaware capes.

The *Kamoi* was at sea for 36 hours on this trial, during which time she was put through tests that brought into play every possible stress on all parts of her machinery and equipment. She was manned by a crew of the New York Shipbuilding corporation in addition to a Japanese crew commanded by Capt. T. Murase. The Japanese naval officers, including Capt. K. Goto, chief inspector in the United States for the Japanese imperial navy, were much pleased with the way the *Kamoi* came through her trial.

The *Kamoi* is a 20,000 ton, 8,000 horse-power twin-screw fuel ship, built in this country rather than in Japan so that she could be equipped with the electric drive, which has been highly developed in the United States. Her electrical facilities, which were designed and installed by the General Electrical Company, includes the use of synchronous motors for the first time with any twin-screw ship.

The main propulsion unit is an 8,000 horse-power Curtis turbine generator, which supplies current to two 4,000 horse-power synchronous motors, directly driving the twin-screw propellers. The excitation current is supplied by two 400-kilowatt direct-current turbine generators, and these also furnish power for the electrical auxiliaries of the ship. The latter include the main circulation pump, main condensation pump, sanitary pump, blower motors, steering gear, radio apparatus, ventilators and light-lighting circuit. As a reserve equipment, a 625 kilowatt auxiliary alternator which can be connected to either of the auxiliary turbines in case of the failure of the main driving unit, has been installed.

The radio equipment, also of General Electric make, comprises a one kilowatt telephone and telegraph transmitter and two complete receiving sets. One of the latter has a range of 250 to 3,000 metres and the other a range of 250 to 30,000 metres.

The normal tonnage of the ship is 19,500, she is 480-ft. long and has a beam of 62-ft. Her draft is 28-ft., and deadweight displacement, 13,000 tons. She is a coal burner, equipped with four Yarrow type boilers.

Tokio Will Sell Bonds To Build New Subways

A series of bonds issues to be floated as the work progresses will finance the new Tokio, Japan, subway, which it is estimated will cost 189,000,000 yen, or about $90,000,000. The American Express Company Securities, which announced the plans for construction some time ago, declares that construction will be begun within a few months. The new subway will extend the length of the city from south to north, with a line crossing at right angles from the city's eastern to its western limits. Tokio has a population of more than 2,500,000 and covers an area approximately the same as that of Paris.

In view of the fact that it is expected that much American equipment will be used in the construction of the subway it is not unlikely that the bonds will be sold there to finance its purchase.

Chinese Develop Palm Fiber Trade With United States

A considerable trade has developed in what is known as "palm fiber" in Hongkong with the United States for the manufacture of brushes. The material is the leaf stem of a small palm which grows wild over much of the South China hill country, and which is generally cultivated in some districts for its leaves—the common palm leaf fan of commerce.

The fiber is obtained simply by soaking the stem and stripping off the outside. The fiber in the stem is then cut into convenient lengths and shipped in bundles of about 200 pounds each. The fiber is used all over South China, in the manufacture of what are popularly known as "bamboo brooms," and for Chinese scrubbing brushes and similar articles.

150,100,000 Bushels of Wheat is Australia's yearly Contribution to the World's Harvesting at Darling Downs, town of Allora in distance

The Commonwealth of Australia

The Unique Continent—The Land of Commercial Opportunity

By Thos. J. McMahon, F.R.G.S.

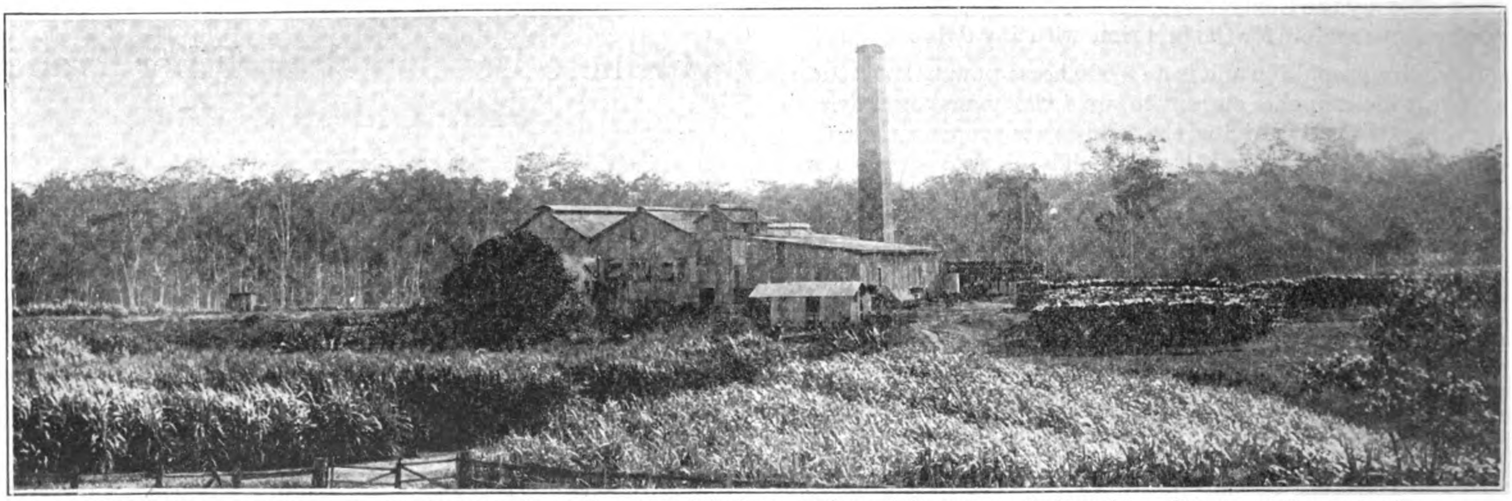
AUSTRALIA is the most recent, the most isolated of the continents, it is the most remote from the centre of the world's activities. The commercial life of Australia is little more than seventy years. The great island continent of three million square miles, with its scanty population of five and half millions, is 2,500 miles from China, 3,000 from Japan. The nearest commercial neighbor, outside the British empire, is the rich island of Java, one thousand miles distant.

The Commonwealth is divided into six states, in population and importance they follow thus: New South Wales, Victoria, Queensland, South Australia, West Australia and Tasmania. The size of Australia can be gaged that the whole of Europe, including European Russia, can fit into it with ease and that it is capable of maintaining adequately at least 100 millions.

The history of Australia begins with the year 1788, when white settlement was begun in New South Wales. Settlement, however, quickly spread, and in the last seventy years the commercial progress has accomplished the following interesting details:—The total value of production is over £300,000,000 a year. There are 25,000 miles of railways, and hundreds of miles in construction. Australia is the greatest wool-producing country in the world with its flocks numbering 80,000,000. Cattle of the purest breeds amount to 20,000,000. In dairy produce, the export of butter, milk and cheese has a value of nearly £50,000,000. Australia cultivates 1,500,000 tons of sugar, and 150,000,000 bushels of wheat annually. Australia with its wonderful and varied resources has the promise of being in another 100 years the world's hive of commercial energy and enterprise.

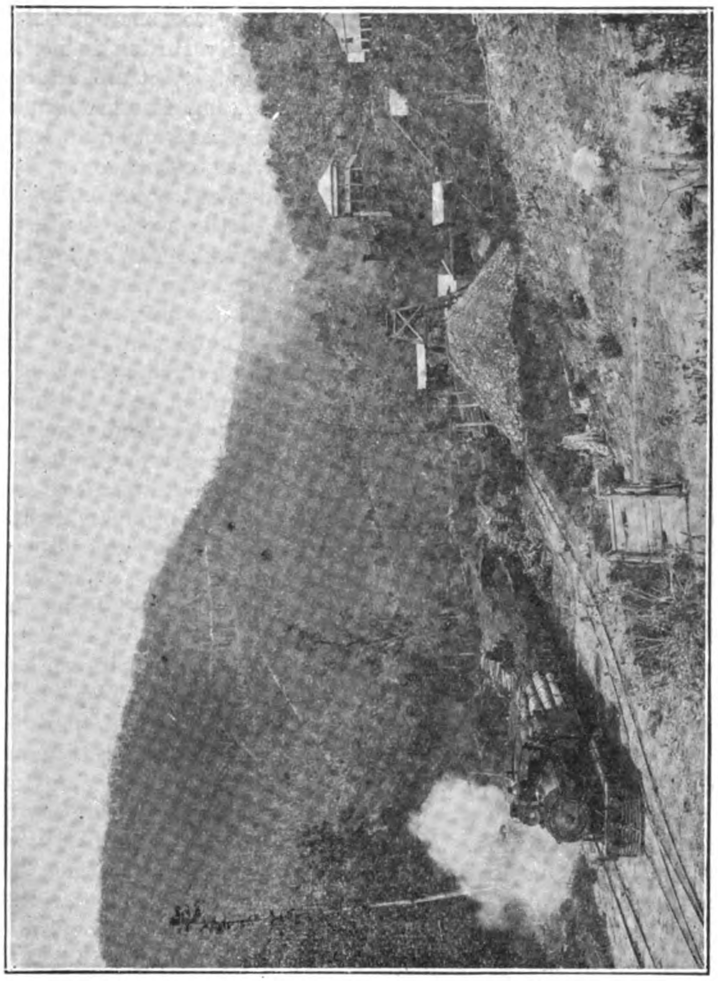
Petries Bight, showing the Custom House and River at Brisbane

The formation of Australia is likened to a tea cup saucer, the coastlands mountainous, and the interior vast. The great central lands now described as a desert, but recent exploration proclaims that one day the desert will smile with the verdure of wheat fields. Mount

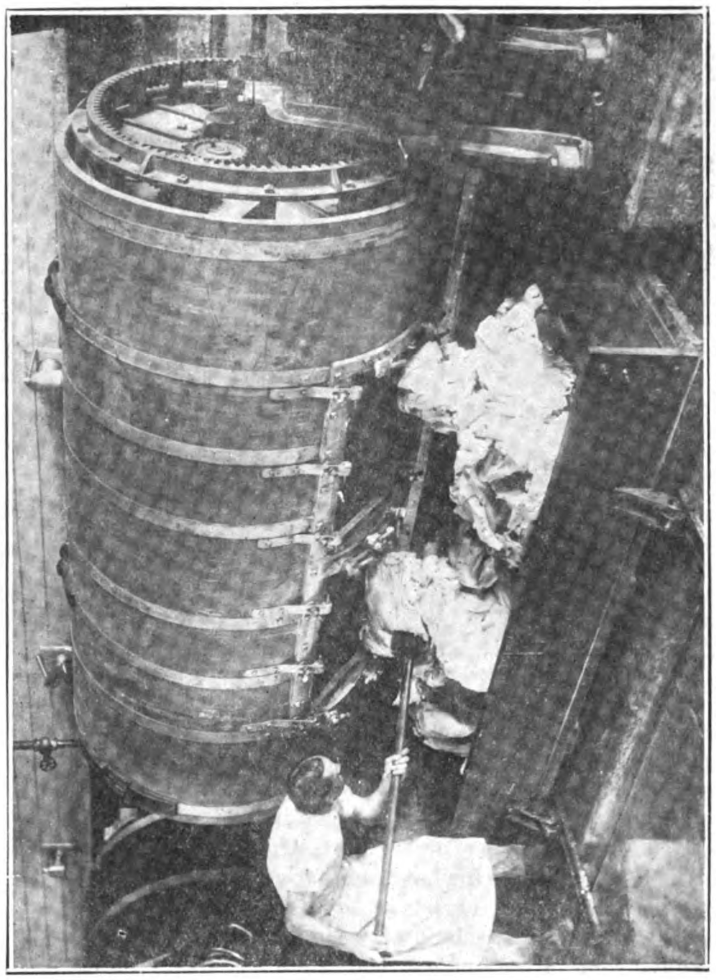


1,500,000 tons of Sugar are Produced in Australia: The Windermere Central Factory in the Bemdabug District of Queensland

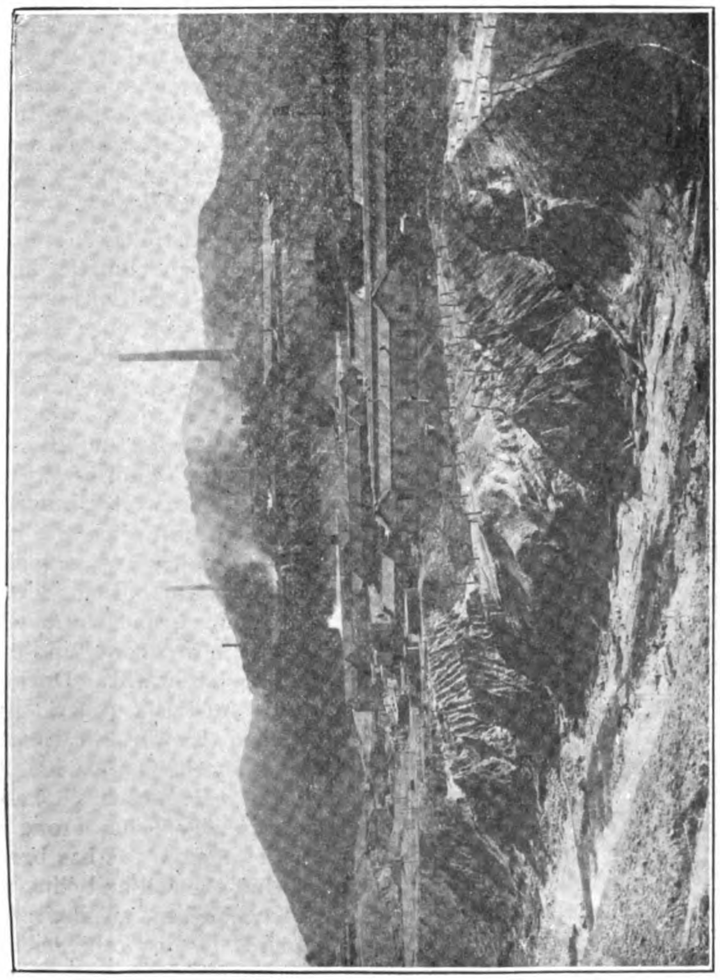
THE WEALTH OF AUSTRALIA



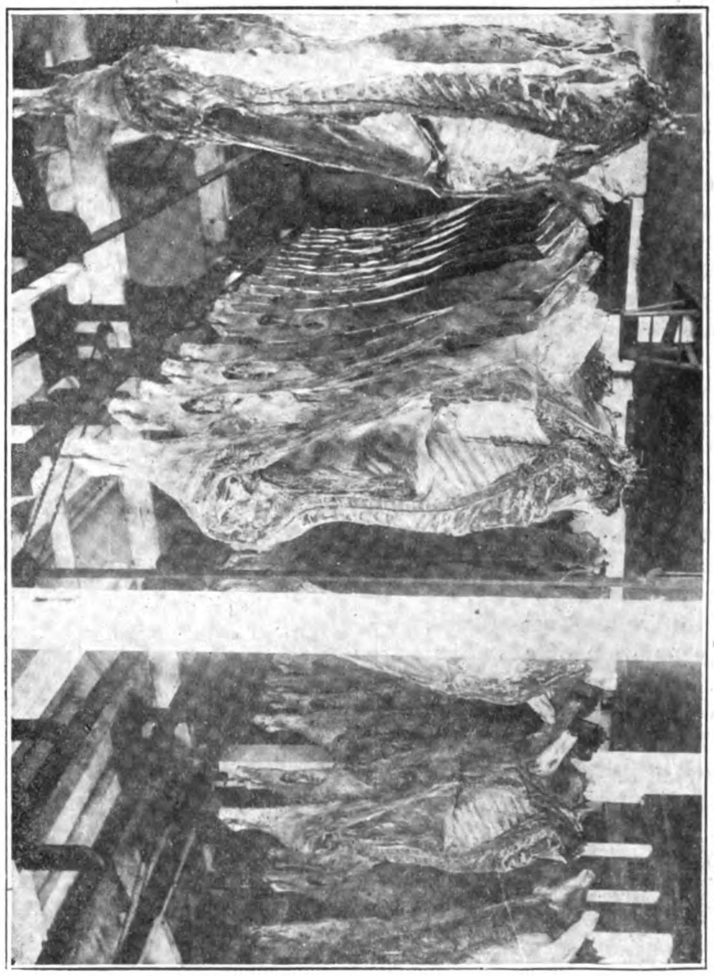
Colliery at Tannymorel, near Warwick, Queensland



£50,000,000 of Dairy Produce is Exported from Australia: Interior View of the Kingston Butter Factory, near Brisbane



The Mount Morgan Gold and Copper Mine near Rockhampton, North Queensland



15 to 20,000,000 head of cattle permits Australia to export large quantities of prime beef; Beef for Export in the Cold Storage Warehouse of the Queensland Meat Export Co. at Brisbane

Dairy Farm at West Talgai, Darling Downs, Queensland

Kosciusko, 7,328 feet, is the continent's highest peak. Australia has many rivers and waterways, but few of any length, depth and of permanent water. Inland rivers are usually great wide, shallow, sand beds with trickling streams, but which in the rainy season swell into great rushing volumes of waters fertilizing thousands of miles. The coastal area is notable for bays and harbors, offering all facilities for shipping. Sydney harbor is admitted the most beautiful in the world. Australia is a land of wonderful scenery, and is not as poets have sung, a land of songless birds, and scentless flowers. With its tall gaunt Gum trees, its strange marsupials, and its endless plains, it is a land of vast distances, of great silence, but possessed of a fascination that thrills, in many respects it is indeed, the most unique of continents.

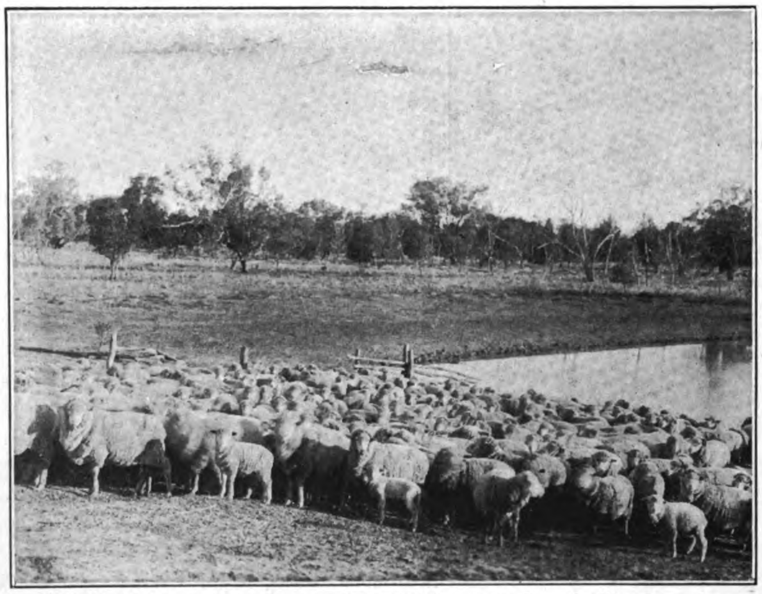
Australia is a sunny land, of genial climates, it is reputed to have one of the lowest death-rates of the world. The people of the continent live in open-air, free, and healthy life, this gives a decided individuality to Australian character, an independence of manner, and initiate, striking to strangers from the old world, or the East. Australian cities are handsome and modern, with electric tramways, fine streets, imposing buildings, public and private, rich institutions, and every class of domestic and commercial conveniences. Australia has now several interstate aerial mail and passenger services, and is arranging for a frequent eight-day trip to England. Wireless installations are counted by the hundreds, the service reaches to the ends of the commercial world. Sydney, the capital of New South Wales, has a population of a million people. Melbourne of Victoria, 700,000, Brisbane of Queensland, 250,000, Adelaide of South Australia of 100,000, Perth of West Australia, 100,000, and Hobart of Tasmania, of 50,000.

Australia has openly proclaimed to the world its ideal of a "White Australia." This is in some countries misunderstood. Briefly explained, the ideal is nothing more than a determination to keep Australia British, Australians whatever local characteristics they may have are distinctly British in ideals, customs, ways and manners. Australia is open to the trade of the world, but it must remain white and British, Australia has every right to its ideal, just as other nations have to theirs.

Australia is the land of many ideals, it has attracted the attention of the world in its reforms in social and industrial conditions. That it has not arrived at a full solution of most social, and industrial problems is very natural, but the fact remains the great Commonwealth is the paradise of the worker, where the highest wages, the shortest hours, the happiest and healthiest conditions are demanded by law. Commercially and industrially Australia has unquestionably made giant strides. Its chief occupations are sheep, wool, cattle, meat, dairy products, fruits, sugar, wheat, general farming products, timbers, sandalwood, minerals and gems.

Every state has its millions of sheep, the whole producing 700,000,000-lbs. of wool annually, and attracting buyers from all over the commercial and industrial world. The sheep bred are the purest to produce the finest qualities of wool. Australia, once looking to the old world for its stud sheep, now stands supreme in the breed of stud sheep, and which are sent to all sheep countries. No country in the world possesses the same natural advantages for stock-raising as Australia. Nowhere is there more absolute dependence placed on nature in regard to the feeding of stock. The pastoral areas of Australia are remarkable for being well watered, well grassed, free from marauding carnivora. Government supervision and laws prevent stock diseases, or the possibility of inferior breeding. It must be acknowledged Australia offers ideal conditions for the raising of stock. As with sheep so with cattle, Australia can boast of the largest cattle stations or runs in the world. It is estimated there are 15 to 20 millions of cattle, and the breeds are from the purest strains. Works for the canning and preserving of meat are numerous, and Australian meat is exported to the world, large quantities constantly going to the East. Great quantities of tallow and hides are also exported. Government supervision again insisting on a clean and healthy meat export industry.

Wheat is very extensively cultivated in Australia, in most states there are climatic and other suitable conditions necessary to successful cultivation, Australian wheat is acknowledged as producing the best quality of flour known to the world's commerce. At one time it was thought wheat would never be cultivated in Australia, indeed, great agricultural scientists insisted Australian soil were lacking in phosphate, but this force was introduced, and the lands responded in a super-abundant yield of glorious wheat. During the war Australia practically maintained the world in wheat, to-day the yield is 150,000,000 bushels a year, and fresh areas are continually being brought under the plough. It has been found that the soil and climate of Australia has an heritage unequalled by any other coun-



80,000,000 Sheep producing 200,000,000 pounds of Wool make Australia the Greatest Wool-producing country in the World: a Sheep Station in Australia

try, Nature has it is evident designed Australia to be the ideal country for wheat. Dairying is an industry that has extended in a full and general way throughout the length and breath of the continent. Dairy herds are numerous and of unquestioned purity of breed. Milk, butter and cheese factories run like a chain round the land. The export of dairy produce is worth £50,000,000 a year, and of quality that has gained a world-wide reputation. The government regulations supervising the manufacture of butter are such that only a commodity of the best quality is allowed to be sent out to the markets. It is said that Australian butter now goes to every country in the wide world.

General agriculture covers many hundreds of thousands of acres in Australia, it has a magnitude which is a vital force in overseas markets. The value of farming produce, maize and other cereals, poultry eggs and other commodities is estimated at £10,000,000 a year. With it possibilities of wheat, and general farming Australia is one of the very few countries that could comfortably and liberally self-support a population of 100 millions.

As in farming so with fruits, both tropical and temperate climate, can be most successfully cultivated. The present annual export of fruits to overseas markets, and principally to the East is well on to £6,000,000 a year. Government regulations are insistent in quality, hence fruit pests and diseases are vigilantly watched for, and quickly destroyed. There is a tremendous future in the cultivation of fruit in the continent. Fruit growers are every day becoming expert in packing, and the art of long distance export is well-nigh perfect. At the present moment interesting ventures are going forward in the trial export of various kinds of fruits to various parts of the world, with cold storage fruit merchants are realizing fruits of almost any kind can be held indefinitely, if handled and watched with interest and care.

Sugar is a product that does well and is cultivated widely in Queensland and the north of New South Wales. The production is certainly costly in the wages paid labor, but as it is mostly for local consumption. Australians are willing to maintain a high price to guarantee white labor in the sugar fields. 1,500,000 tons of sugar are produced in the year, and this materially helps an industry which is becoming important and that is jam making. Australia can easily produce the fruits, and the sugar to keep the whole world in the finest quality of jams.

Australian timbers are of great variety, and all of commercial value. Hardwoods are famous for constructional timbers, it surpass the British oak, Indian teak, the Lignum vitae of the West Indies. Australia has many timbers of beautiful grain most useful for the making of furniture for house decoration. Queensland maple has now a wide-world reputation for these purposes. Cedars, pines, oaks, kauri and innumerable timbers are found in great forests all over Australia. Sandalwood from North Australia, mostly Queensland, is exported in very large quantities annually to China.

The mineral wealth of Australia is considered inexhaustible. In the last fifty years £1,000,000,000 worth of minerals, including coal, have been exported. At present the mining industry is suffering a slump, in the poor world demand for one thing, and in the demand of high wages for miners. But there are signs that go to show the industry is likely to revive. In the matter of gems, opals and other precious stones, the state of Queensland is making much progress, and there is a steady and growing demand from Europe, India, China, Japan and America for Australian gems. The recognized finest quality pearls are got from the shallow sea of the Torres Straits Islands in the northern waters of Australia.

Cotton was many years ago cultivated in Queensland, but the industry declined. To-day, and for the last three years, there has been a very remarkable spread of the cultivation of cotton in the whole of Australia. How it is progressing can be understood when from Queensland along £60,000 worth was last year sent to Liverpool. Ginneries, modern and commodious, are being erected in all the states. Governments are subsidizing the growers, and by drastic regulations keeping cotton crops healthy.

Many other products might be taken and details given of their successful cultivation and progress, it suffices to say nothing is being carried on or attempted in Australia but has every promise of success. With the production of products, so is trade keeping pace. Australia is a land of vast resources, unlimited commercial possibilities, it is a veritable land of promise, to the capitalist and the trader it is a great land of opportunities.

In the prosperity of Australia so assured by generous nature, it is hoped that China and the East, will, by trade materially assist, so as to make the Commonwealth of Australia a great commercial nation.

Chinese Make Paper From Bamboo

PAPER has been manufactured in China since the beginning of the Christian era, writes H. K. Richardson in *Chemical and Metallurgical Engineering*. Paper money is mentioned in the history of Szechuan as early as A.D. 960. To-day this industry is carried on in much the same way as it has been for the past ten centuries.

Many different kinds of paper are made in the western provinces of Szechuan and Kweichow, of which four are of particular interest. These are:

1. Kou pi chih, or bark paper, which is made from the paper mulberry, probably the original paper made in China.
2. Rice paper, so called, which is sliced from a pith.
3. Ts'ao chih, or coarse paper, made from rice straw or reeds.
4. Chu chih, or bamboo paper, made from young bamboo trees.

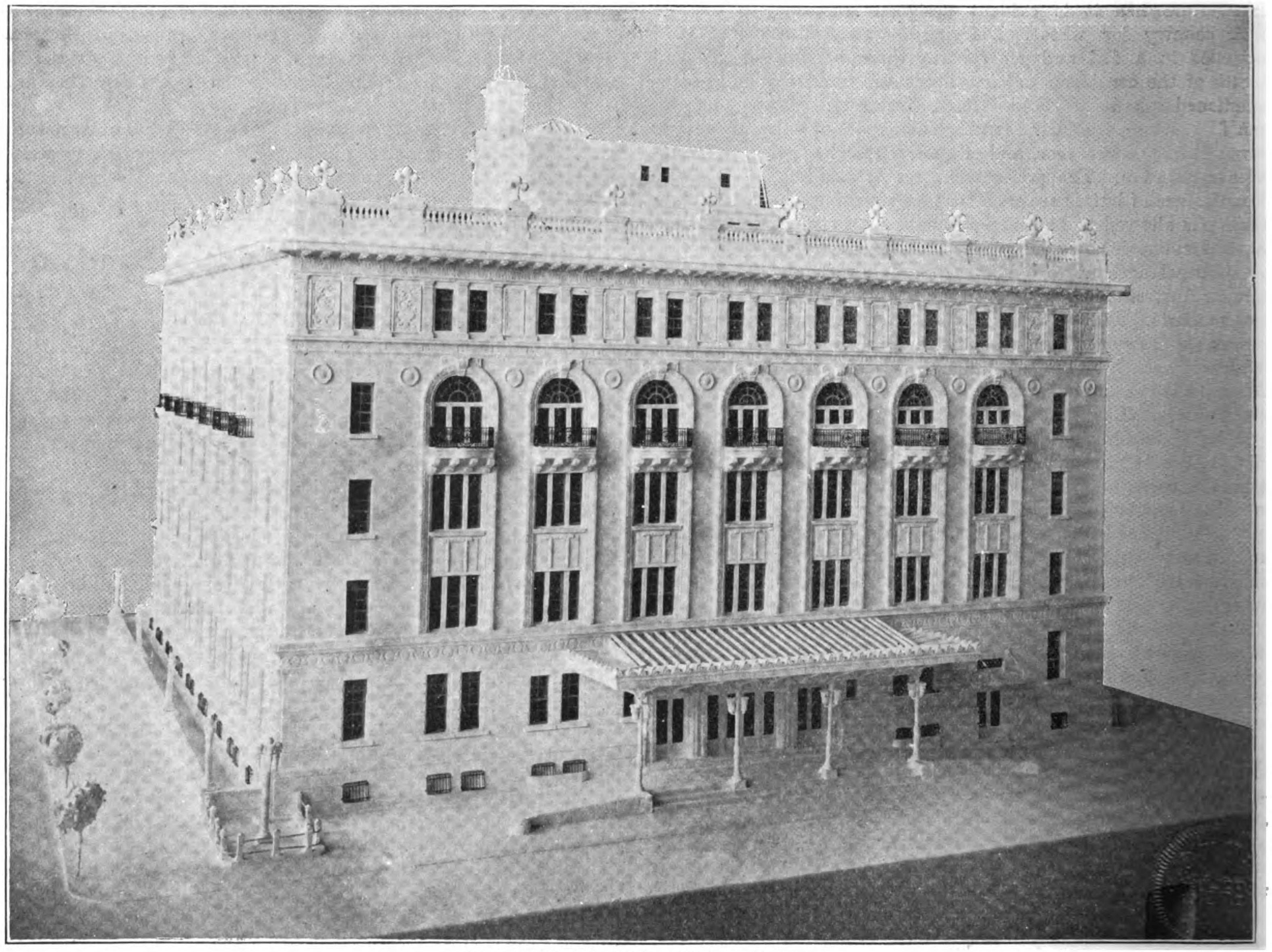
Each of these papers is made by a method more or less distinctive, but chu chih is the most interesting.

The best paper produced in Szechuan is made from bamboos by a process said to be over ten centuries old. More than thirty varieties of bamboo grow in western China, of which only two are commonly used for paper making. These are tzu chu or spiny bamboo, bambusa arundinacea, and ch'ung chu or grove bamboo, phyllostaclys heteroclada. The second is used by most paper makers. This variety grows to a height of sixteen to eighteen feet and is one and one-half to two inches in diameter. It grows to the full height in about two months, naked of leaves. When the full height is attained leaves spring out at each joint, which roughly represent each day's growth. Most Chinese paper makers prefer to use the young culms before this leafing-out occurs, for they say the leafing-out process hardens the nodes and makes them difficult to reduce by the usual retting process.

The process used to turn this bamboo into paper varies a little in the different parts of the province. The process as it was observed in the district along the Chengtu-Wanhsien Post-road will be outlined here.

The bamboo is cut into eight-foot lengths and then split lengthwise into eight parts. The split cane is laid in pits with alternate layers of lime, about 10,000 catties of bamboo with 1,000 catties of lime making up a charge. The matted bamboo is weighted down with stones and covered with water, in which condition it is permitted to stand for two months. The bamboo is then removed, washed and soaked for two months in clean water to bleach out the lime. The water is drawn off and the mass permitted to rest in this moist condition for the months after which it is hammered to a pulp in a mortar or stone mill and finally is rubbed to a fine pulp in a stone trough by stamping under foot. This pulp is mixed with cold water and mucilage 'n stone vats, after which it is dipped out on hand frame where are stacked in a press and pressed semi-dry. The sheets are dipped singly into rice water and are then dried on the side of a hot kiln.

Hosie and Wilson, describing the same process, state that the first reduction of the fibre is done in the vats with wooden rakes. They also state that 1 to 3 per cent. of the soda is added to the slaked lime in the retting process. It is known that caustic soda is sent to the Chungchow and Mienchu districts for paper making by importing firms. This use may account for the fact that the paper from these districts is whiter and better than that from the other districts. Probably a much larger amount of caustic would be used if the $200 a ton freight charge and the extra importing commissions did not make the price almost prohibitive.

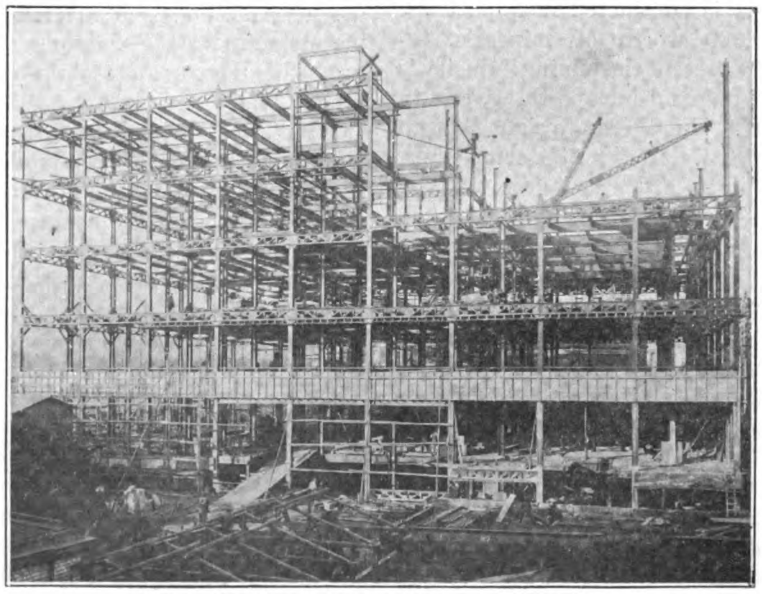


Model of the New Palace Hotel at Tokyo

Magnificent Social Centre for Tokyo

ANOTHER magnificent three million yen hotel and amusement edifice is rapidly nearing completion in Tokyo and is expected to be finished some time during the month of November. This is a handsome five storey building in Marunouchi near the Imperial Theatre, in the centre of Tokyo's business district, erected by the Shimizu Gumi, one of the best known firms of Japanese contractors for the Tokyo Kai Kan Company. The building will embrace all the features of a high-class amusement and entertainment palace combined with those of a first-class hotel and will be equipped throughout with the most modern sanitary, heating and other facilities and furnished with the most luxurious fittings.

In the basement of the building will be located the kitchens, boiler room, ice machine, storage and rooms for employees. The first floor will have the regular dining room, bar, billiard rooms and parlors. The second floor will be given over to special dining rooms and the third floor to Japanese entertainment rooms, while the fourth will be taken up by the grand dining room. The fifth floor will be divided into guest rooms. The roof will have a garden.

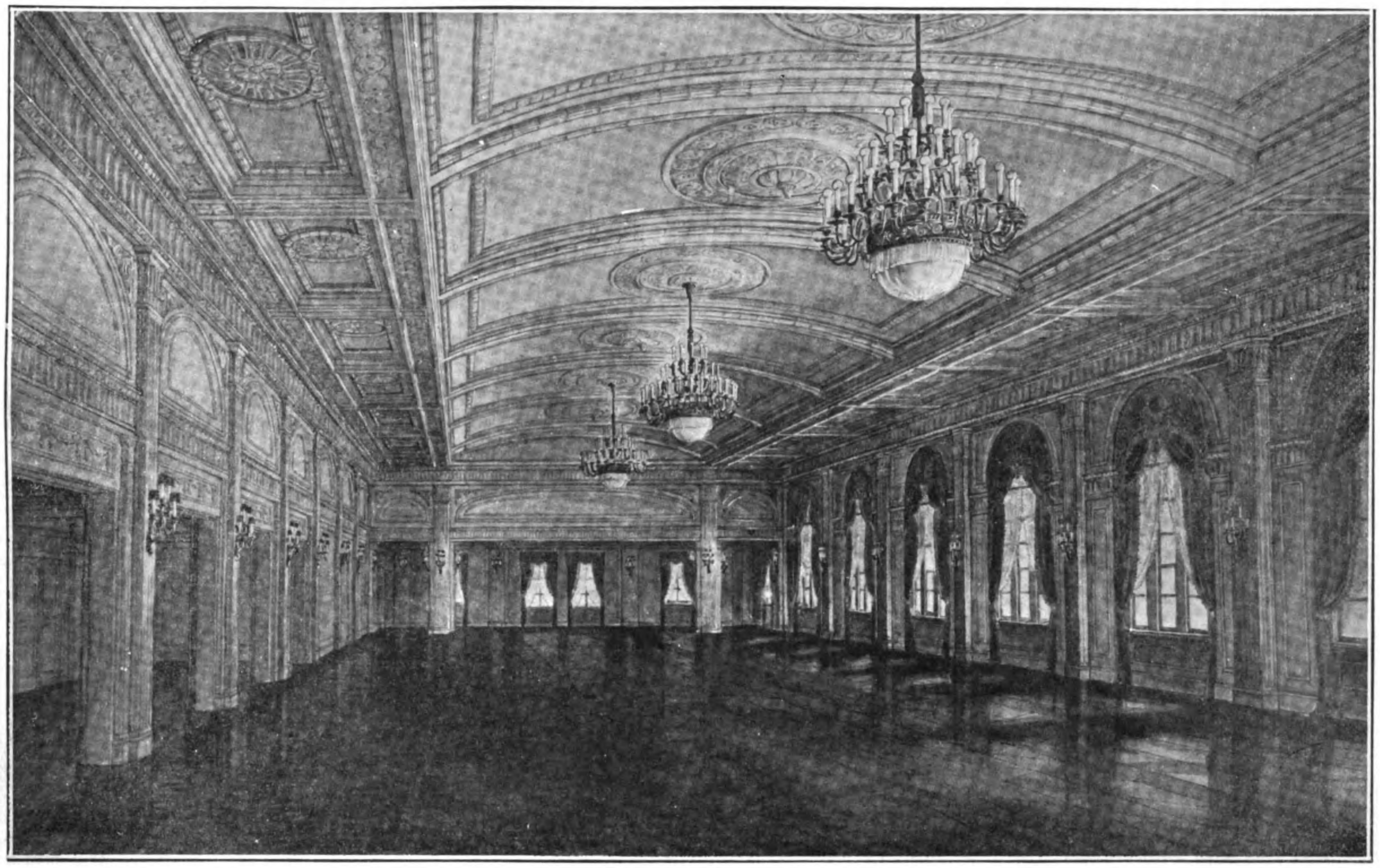


Palace Hotel at Tokyo in Course of Construction

Separate stairways will be built for ascending and descending and for employee's use and two elevators installed for carrying the food from the kitchens to the dining rooms and for transporting baggage. There will be four passenger elevators. The entire building is of reinforced concrete, the outside walls finished in with bricks trimmed in marble and rock quartz. All partition and floors are of re-

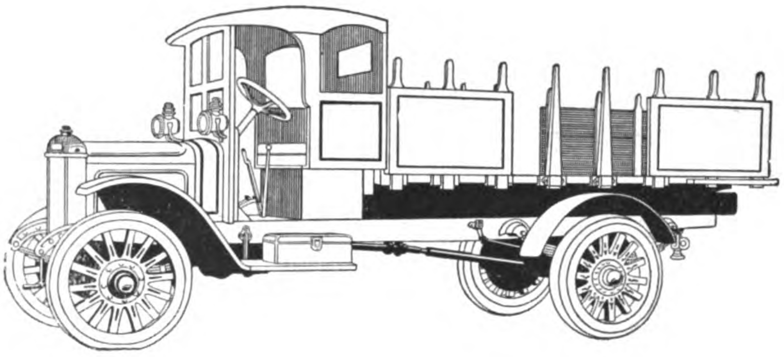
inforced concrete, and the tank on the roof with a capacity of 7,500 gallons will supply the building with water. In addition to all up-to-date fireproofing, two fire escapes are also installed.

Hot and cold air ventilation is provided for ball and dining rooms. Mr. R. Fujiyama, chairman of the Tokyo chamber of commerce, will be manager of this magnificent new hotel, which will cater largely to Japanese. The building is specially designed for the accommodation of the many private social functions, such as weddings, banquets and Japanese ceremonies, which form such a large part of Tokyo's social life.



THE BALL ROOM (top) AND CONCERT ROOM (bottom) OF THE NEW PALACE HOTEL AT TOKYO

"UNEQUALLED SERVICE TO THE USER"



REPUBLIC

Built to stand the rough and constant service to which a satisfactory commercial vehicle must submit Republic Trucks by their rugged construction and high power-efficiency deliver unfailing haulage at the minimum cost per ton-mile.

Whatever be the usage to which your vehicles are put, there is a type of Republic Truck that will meet your requirements.

REPUBLIC

CENTRAL GARAGE COMPANY, LIMITED

9 HONGKONG ROAD, SHANGHAI

REPUBLIC TRUCK SALES CORPORATION

Alma, Michigan, U. S. A.

CABLE ADDRESS: "REPUBLIC"

The
FAR EASTERN MOTORS
MOTORING-AERONAUTICS-MOTOR BOATING

Body Building in Shanghai

Works of the Shanghai Horse Bazaar & Motor Co., Ltd.

ONE of the most up-to-date and complete body building plants in the Far East, equipped with modern machinery and appliances throughout, is operated by the Shanghai Horse Bazaar and Motor Co., Ltd. This firm was established in 1851 as the Shanghai Horse Bazaar, Ltd., and with the growing importance of the automobile and the increasing demand for dealer representation, the directors looked over the field for a suitable agency. The company took as its first motor car agency the representation of the Berliet, and with this new departure, added the word "motor" to its corporate name in 1914. The firm are now agents for the Rolls-Royce, Studebaker, Arrol-Johnson, Vauxhall, Fiat, Maxwell and the Berliet cars.

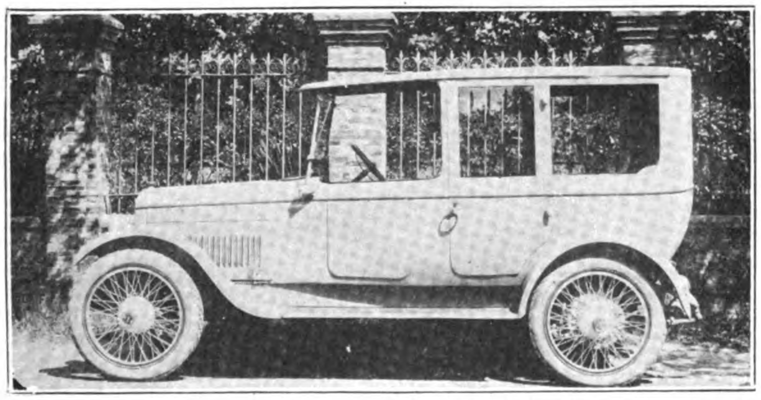
Because of the high freight rates, duty, insurance and the dozen and one little things that enter into the selling costs and which all help to increase the price of the cars, it was deemed more practical to bring out the chassis and build the bodies in their own shops. This idea not only proved profitable, but created such a demand for custom built bodies, that in the fall of 1916, their facilities were taxed to such an extent that they had no alternative but to seek larger quarters to take care of their orders. The result was their expansion to the buildings directly across from their Burkill-road entrance.

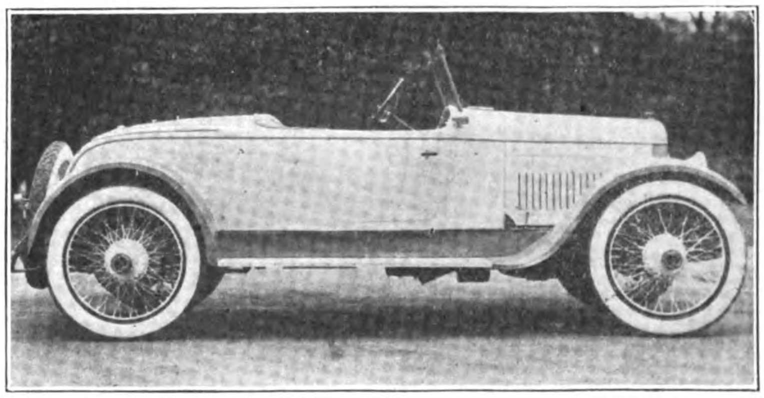
The new and enlarged quarters were remodeled to suit the needs to which they were to be put. This necessitated but little work and with the installation of modern equipment and appliances, the plant was soon turning out finished jobs. Since then it has been necessary to install further new and up-to-date equipment in order to facilitate the work and at the same time maintain the high quality of workmanship for which the Shanghai Horse Bazaar and Motor Co. pride themselves.

The various departments are under the care of trained Chinese, while a staff of foreign experts supervise and inspect all work that is done. All the various articles that go to make the bodies are specially imported from America and Europe.

Starting with the carpenter shops and ending with the sales rooms, one is surprised to find such an up-to-date plant in the Far East. The framework for the bodies is made from selected ash, properly seasoned. Those unexposed parts that are liable to strain are reinforced with steel braces that are forged in their own blacksmith shops. From here the car is sent to the next department where the aluminum body is cut and fitted to the frame. This being done the seams are welded and filed smooth. The car is then ready for the tailors, who, with a knack that comes from long experience, soon have the weather-proof top fitted with such exactness as to make the down-town tailors look to their laurels. The next operation is the fitting of the windows, wind shields and the side curtains. If the car should be of the closed type, the glass is packed with rubber tape to prevent rattling and is set in brass frames that are nicked plated to prevent rusting.

With the completion of the last operation, the car is ready for the painter. But before the paint is applied, it is first gone over with a portable electrically driven revolving brush. This process both cleans and shines all the metalwork, and so eliminates any possibility of spots on the finished job. The painter then goes very carefully over it with a filler. When this has dried, the paint is applied with an air brush or what is more commonly known as the spray system. This system insures an evenly distributed coat



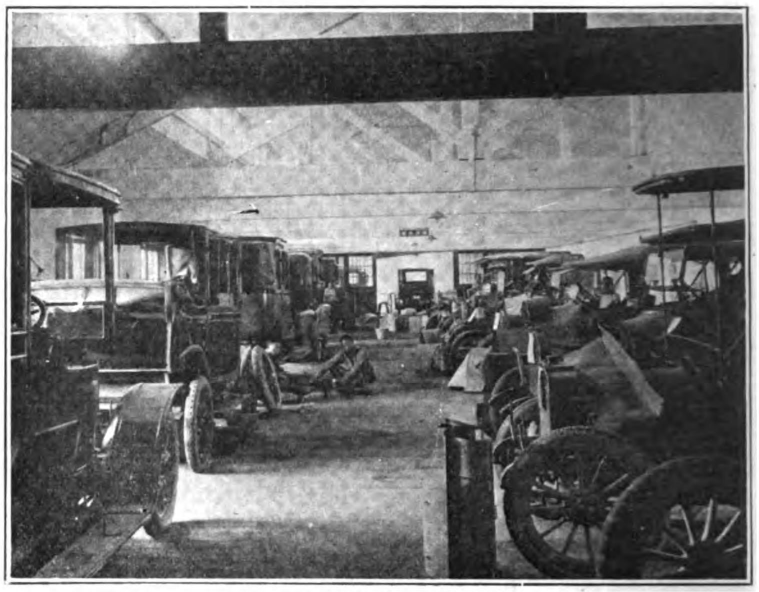


Samples of Coachwork by the Horse Bazaar on Light Six Studebakers

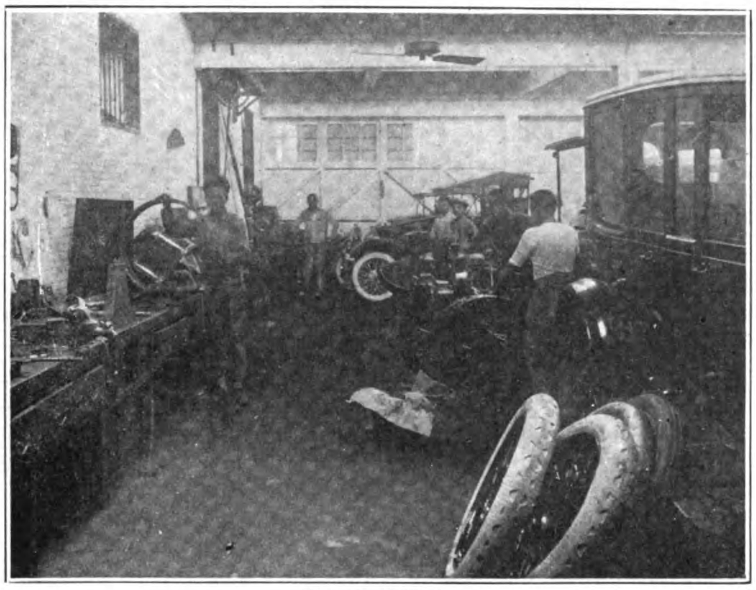
of paint and eliminates any hairs from adhering to the surface. The average number of paint coats is three and with the drying of the last, it is sent to the varnish room. This is a dustproof room that accommodates four cars. The temperature of this room is controlled by a rheostat, which automatically maintains an even heat. The plant has a capacity of 100 paint jobs and 25 bodies a month.

The floor of the garage is capable of storing 150 cars, while private stalls accommodate another 100. Attached to the garage is a complete machine shop, equipped with lathes, drills, power cutters and hammers, air-compressors and modern appliances of every discription. A modern vulcanizing and tire shop is also on the premises. Three hundred winter tops can be stored in a special room for that purpose. The battery recharging department has two motor generators with a capacity of recharging 400 batteries per day. In conjunction with this is a testing room fully equipped to test any and all kinds of electrical equipment. Some idea of the diversity of the accessory stock is gained by noting the fact that 7,000 parts and accessories are being carried in stock.

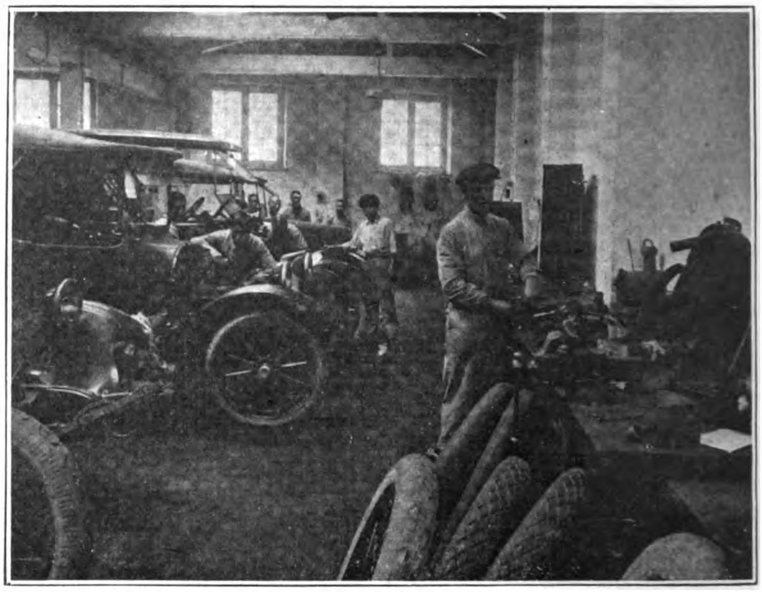
The importance of the Shanghai Horse Bazaar and Motor Company's organization is indicated by the 450 odd workmen employed by the motor department alone.



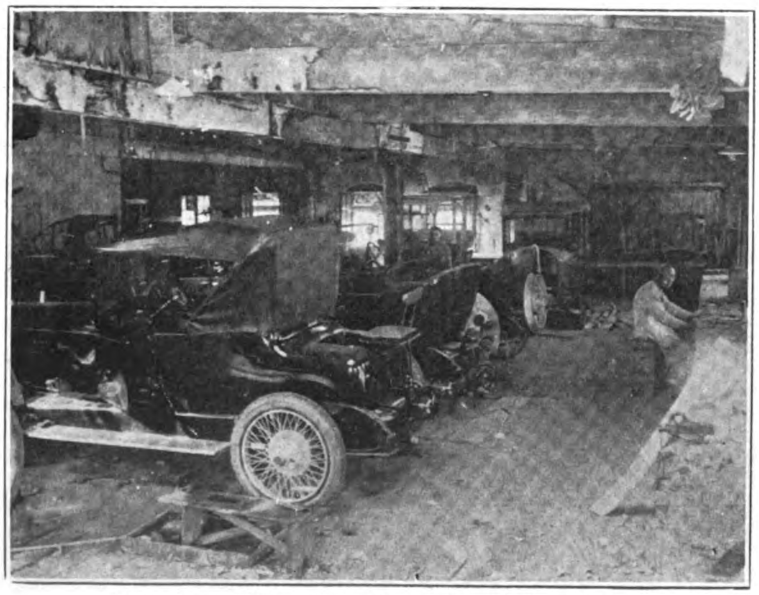
Part of the Paint Shops



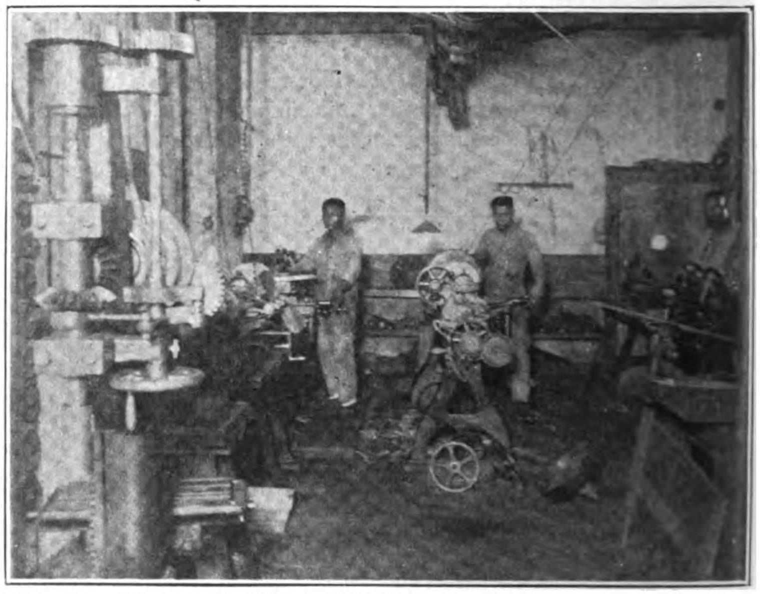
Repair Shops



Repair Shops



Part of one of the Floors Devoted to Body Building



A Corner of the Machine Shop

15-Ton Heavy Duty White Truck and Semi-Trailer of the Shanghai Electricity Department

Largest Truck in the Far East

IN order to meet the constantly increasing demand for electric power and with the growing importance of Shanghai as the industrial centre of the Far East, the Shanghai municipal council, last year, received from the International General Electric Company's wire and cable department, 120,000 feet of what is said to be the largest armored cable in the world.

The cable is of what is known as the split conductor type. It measures about four inches through, and is slightly more than a foot in circumference. Its weight per thousand feet is 18,072 pounds, which would make the amount of cable ordered by the council weigh over 1,084 tons.

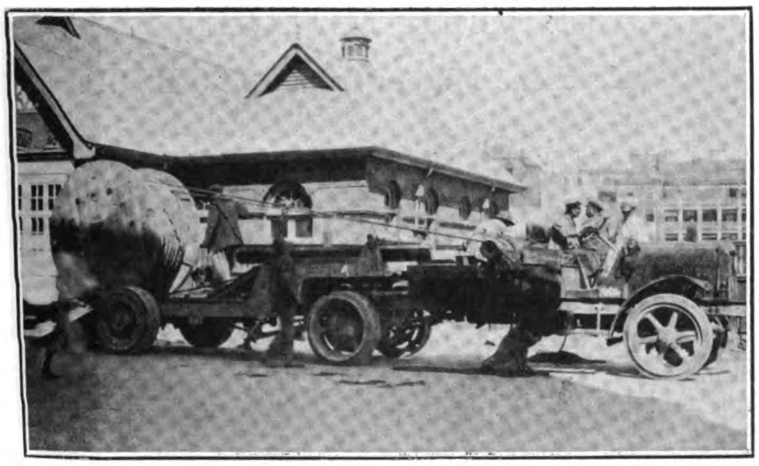
Of further importance is the recent delivery to the council of a specially designed motor unit for the hauling of heavy electrical transformers and cable drums, the largest truck of its kind in the Far East. The equipment was manufactured by the White Company, one the largest manufacturers of high-grade motor trucks in the United States.

The unit consists of a heavy duty tractor and semi-trailer, capable of carrying a maximum load of fifteen tons. The tractor is equipped with a power winch which is operated by the truck engine through a special White power take-off and driving tower. Niggerheads or spools, are mounted on each end of the winch drum shaft. These may be operated independently of the drum, permitting the cable drum to be used on straight pulls while extra pulls may be made from the niggerheads without the necessity fo manœuvring the truck into a different position.

The tractor chassis has been specially constructed to deliver the maximum tractive power, the gear ratio being much lower than standard and the rear wheels smaller in diameter. The winch may be used for loading or unloading, as illustrated in the accompanying photographs; or for pulling cable through conduits or wires over cross-arms, etc. The wide range of usefulness of such equipment means great saving in labor and time in many lines of work.

That this new motor unit is more than meeting expectations is attested by the official of the electricity department. The fitting of this truck to the special work required of it is an excellent example of the effort on the part of the manufacturer to help solve transportation problems as well as to sell trucks.

The Ujigawa Denki Kabushiki Kaisha of Osaka, Japan, which furnishes most of the electric power for this, the largest industrial city of Japan, has recently purchased another 2-ton White truck, equipped with power winches through Sale & Frazar Ltd., White distributors for the Japanese empire. This truck will also be used for the purpose of hauling cable drums, and the numerous other uses to which a winch truck may be put.

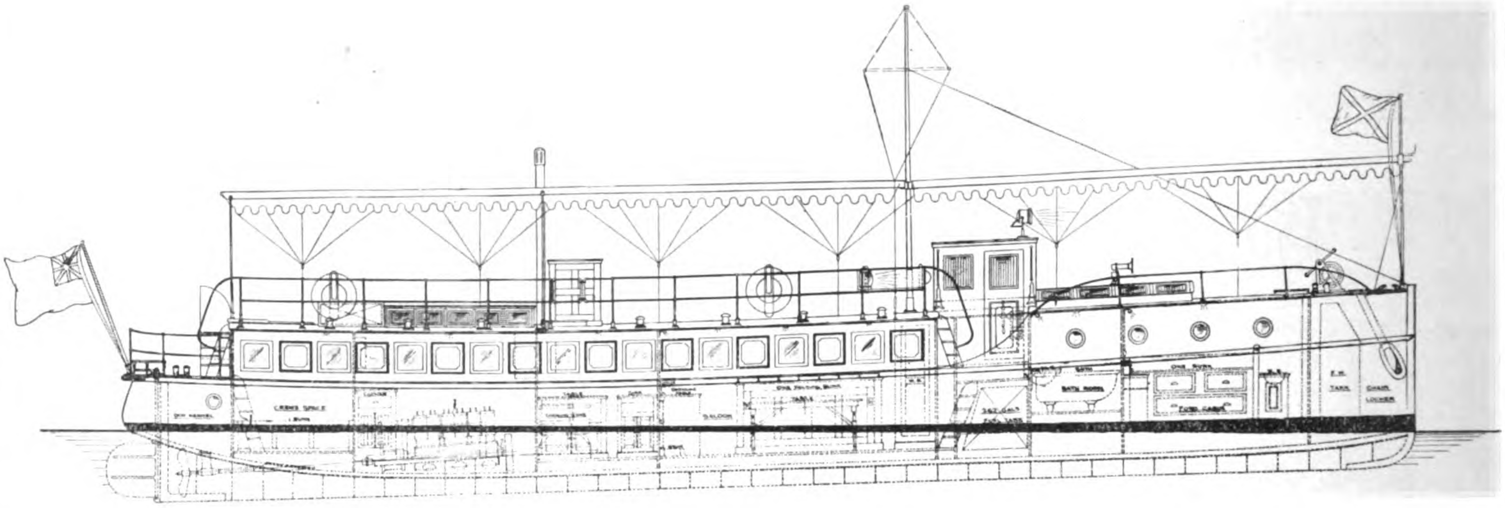


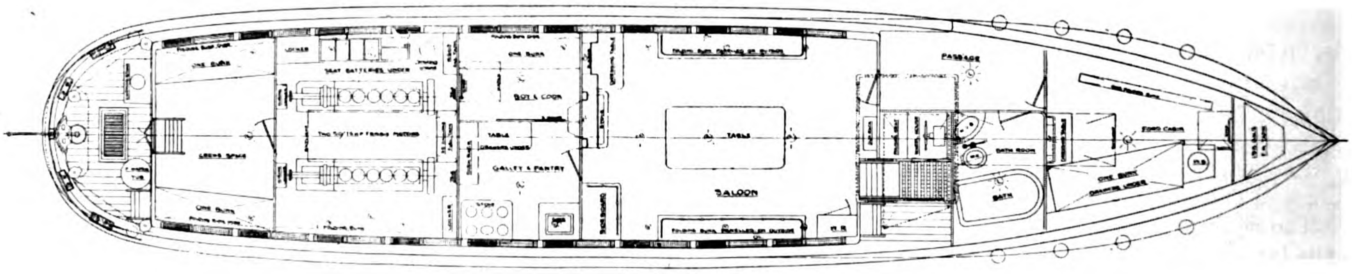
Loading Cable Drums with Winch driven by Truck Motor

JARDINE, MATHESON & CO., LTD.

Builders of steel and wooden craft of any draft to suit inland waterways and harbor service.

First-class workmanship and material guaranteed
Motors and complete launches in stock.





AGENTS FOR—

CRUDE OIL	KEROSENE
WM. BEARDMORE & CO., LTD.	**GLENIFFER MOTORS, LTD.**
Heavy Duty Engines from 10-600 B.H.P.	**Kerosene Motors from 10-90 B.H.P.**

BRITAIN'S BEST IN MARINE ENGINES

WORKS—POOTUNG:
OPPOSITE THE BUND

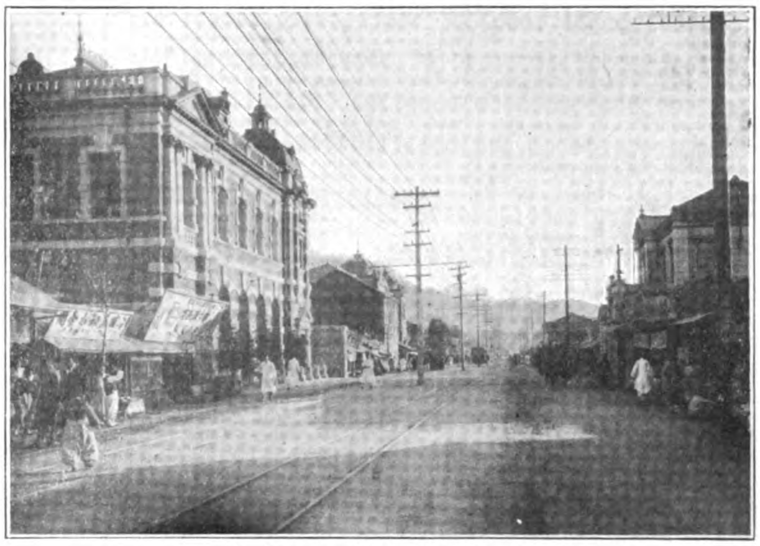
TELEPHONE C. 241

OFFICE:
8A YUEN-MING-YUEN ROAD

SHANGHAI

Road Building in Korea

BEFORE the establishment of the government-general, regulations relating to civil engineering were practically non-existent, and public properties, such as roads, rivers, etc., were in a most neglected state and subject to abuse by the people, so much so that the local authorities were powerless to check them. Though the introduction of the protectorate opened the way for reforms in these matters, the lack of resources prevented any solid foundation being laid, and it was only possible to take in hand that which was urgently necessary. But, on annexation being effected, the government-general at once put forth efforts to improve this condition, and from 1911 onward promulgated regulations relating to roads, urban buildings, vehicles, rivers, reclamation works, etc., and not only laid a solid foundation for civil engineering administration but also engaged in the repair of roads, harbors, etc., on a large scale, and started the systematic investigation of the principal rivers in the country.



An Improved Street in Seoul

Road-making was all but an unknown science, and roads worthy of the name were consequently lacking, thus completely blocking all progress, so it was planned to construct a regular network of them under four classes, of which the first and second were to be constructed and maintained by the central government, the third by the provincial governments, and the fourth by prefectural municipalities, districts and islands, except that in urban districts all classes, where necessary, were to be controlled by the prefectural municipality.

When repairs were made in olden times the *Puyok* or corvée, that is, compulsory service, was put into force, and this usage was continued even after the annexation, especially with regard to those persons unable to discharge their duties by a monetary payment. In addition, it was customary to induce the people to surrender land for roads free of cost. With the reform in the government organization all this was changed, and in October, 1919, it was decided that the construction of first and second-class roads should be conducted at national expense, corvée abolished, and the land necessary purchased at a fair price, resort to the old custom being allowed only in the case of third class roads, as these were closely connected with local interests.

The introduction of a fundamental system regarding rivers was also necessary, but investigation of them not being completed, regulations concerning them touch only on their utilization and preservation. The same is the case with harbors, open ports, naval ports, and certain others under the direct control of the government-general or of the provincial governments.

Other public undertakings of various kinds often require the expropriation of land, so in 1911 a land expropriation law was promulgated that the smooth development of such enterprises might be secured.

Road Improvement

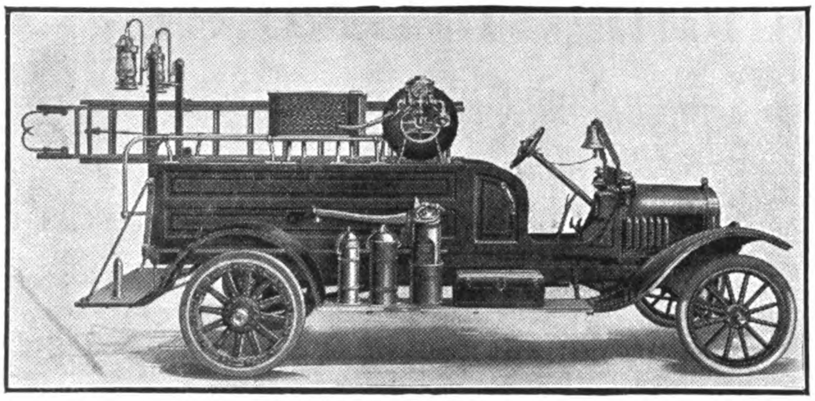
It goes without saying that the maintenance of roads in good repair is most necessary, so during the four years of the protectorate *régime* over Y.3,900,000 raised by industrial loans and from other sources was spent in repairing roads aggregating more than 200 *ri* in length, but the work done was far from thoroughgoing, and, taking the country as a whole, good roads were decidedly lacking, and traffic and transportation were conducted with difficulty on foot or horseback along narrow, deep-rutted, and meandering tracks, thus effectually preventing cultural progress and economic development.

In order to overcome this obstacle to progress the government-general regulated that first-class roads were to be four *ken* or more in width, second-class roads three *ken*, and third-class roads two *ken*, and also engaged in the repair of roads in a systematic way.

According to the network of roads projected by the government-general, those to be constructed at national expense are 17 of the first class measuring 789 *ri* in length, and 79 of the second class measuring 2,352 *ri*, while those to be constructed at local expense number 419 of the third class measuring 2,839 *ri*. As the expense of keeping them in repair is great, the work is done in sections, and those most in need are first taken in hand.

Road to Onyo Hot Spring

Road to the Jyujo Hot Spring



$1,000 A SECOND

That is a conservative estimate of the cost of time lost in getting to fires. To protect small towns, we have mounted complete chemical equipment, hose body, ladders, axe, and hand extinguishers on a Ford Chassis.

These sturdy trucks are speedy and save many valuable seconds in the early stages of a fire. The chemical equipment used is the same as that used on apparatus in the largest cities. Tank is of forty gallons capacity.

We are also manufacturers of commercial motor trucks, and other types of fire-fighting apparatus.

Write to-day for further particulars to one of the following:—

Okura & Co.	Tokyo, Japan.	Mustard & Co.	Shanghai, China.
Pacific Commercial Co.	Manila, P. I.	Richard Johansen & Co.	Hankow, China.
Dodge & Seymour (India) Co., Ltd.	Calcutta, India.	Brewster & Co.,	Foochow, China.
E. W. Frazar & Co.	Tientsin, China.	Andersen, Meyer & Co.	Shameen, Canton, China.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

Export Department, Fisk Building, Broadway at 57th Street, New York, U.S.A.

Cable Address: "AMLAFRANCO"

Codes: A.B.C. 5th Edition Western Union, Bentley's.

SOCONY AUTO OILS

Are manufactured for a simple purpose . . . to lubricate automobile engines. The rich lubricating qualities of our oils afford perfect lubrication to the wearing parts. Not only is this true in summer, it is equally true in Midwinter.

We have four grades of Auto Oils to meet every condition and requirement of the motorist.

Auto X Light
„ XX Medium
„ XXX Heavy
„ XXX E. V. Extra Heavy

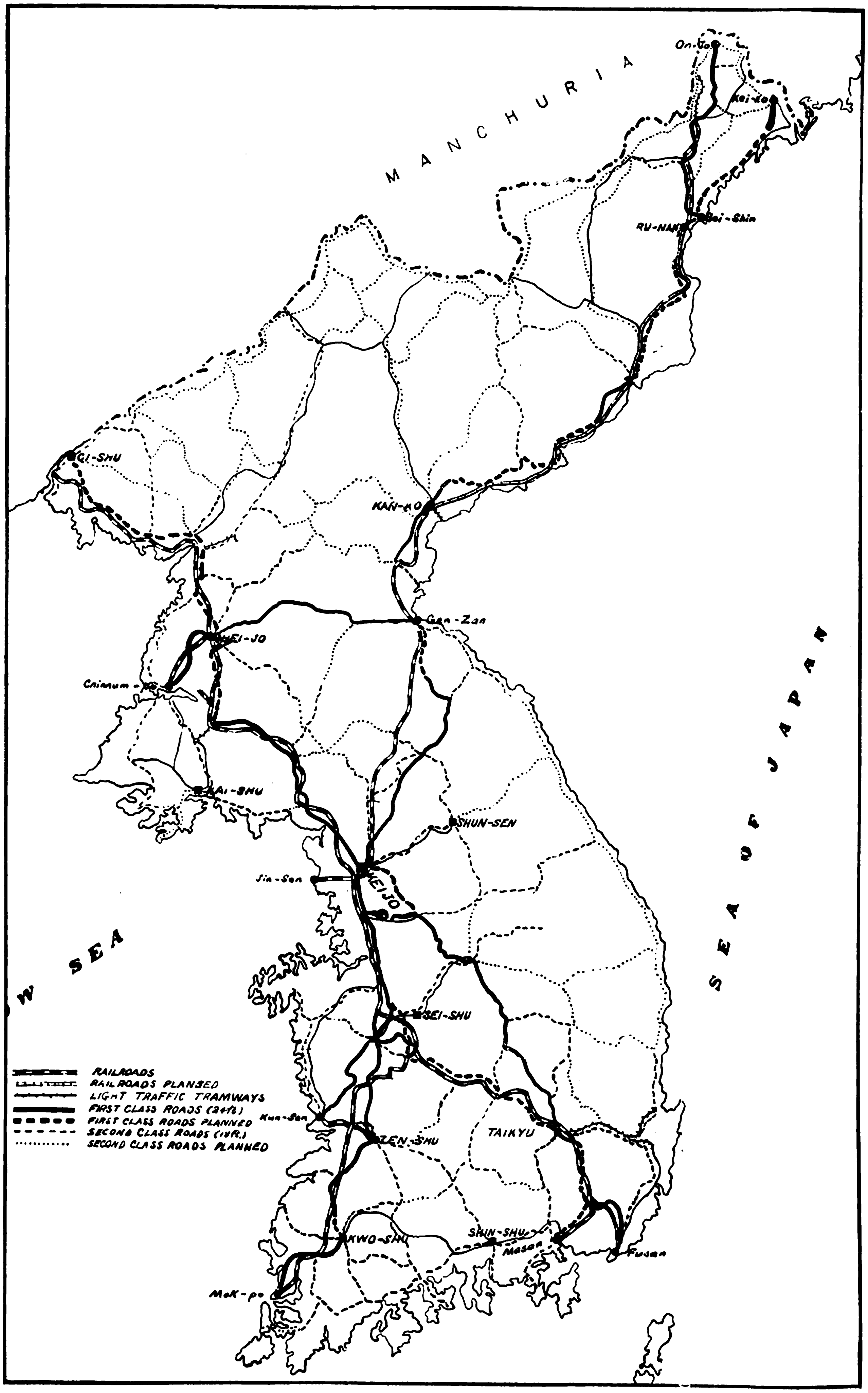
Obtainable at any Garage in China

The first program of the government-general was completed in October, 1917, at a cost of Y. 10,000,000, and comprised first and second-class roads measuring 685 *ri*. This work took seven years to accomplish, and during the latter years an iron bridge was constructed over the Kan river.

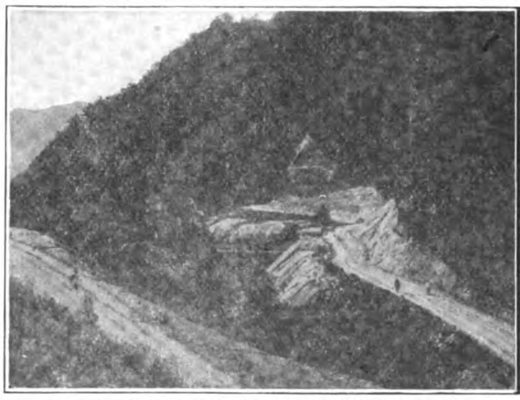
For its second program the government-general plans the construction of 26 first and second-class roads measuring 478 *ri*, and nine bridges, and entered in the budget estimates amounting to Y.7,500,000 spread over the six years from 1917 to 1922. Although it is in the course of execution, the rise in price of material and labor and the inclusion of several new roads in the program have necessitated an increase in the first estimates for it.

Besides directly engaging in the work the government-general has annually subsidized the provinces to the amount of from Y.100,000 to Y.300,000 to assist them in building third-class roads, and, moreover, expended Y.3,000,000 in bringing over 900 *ri* of first and second-class roads and over 1,800 *ri* of third-class roads into conformity with the regulation standard of width.

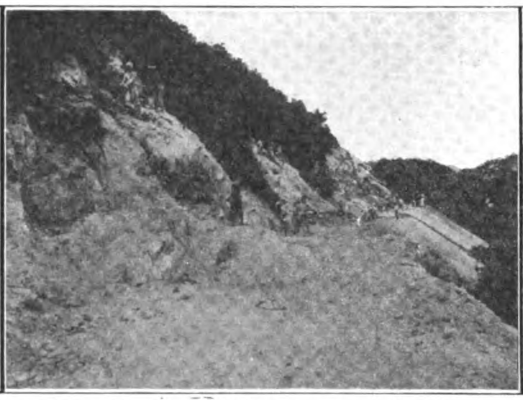
According to the latest investigation the length of roads already constructed is over 1,700 *ri* of first and second-class roads and over 1,800 *ri* of third-class roads, or 56 and 60 per cent. of the lengths set down in the projected network, while roads traversed by public automobiles measure over 1,000 *ri*. Thus a complete



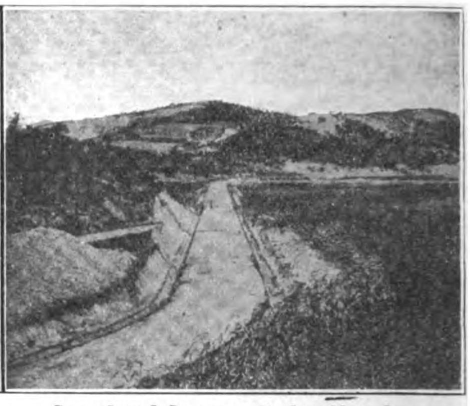
MAP OF KOREA



Excavating on the Seishin-Kainei Road, North Kankyo Province



Mountain Road Making in Keiki Province



Completed Section of the Shinshu-Shoshu Road

transformation has been effected in traffic and communications throughout the peninsula.

The latest statistics for roads and vehicles compared with those for 1911 are given in the following table :--

LENGTH OF ROADS COMPLETED.

	End of 1911 *ri*	End of 1920 *ri*
First and second-class roads	200	1,759
Third-class roads	7	1,134
Total	207	2,893

Note.—The length of third class roads is that existing at the end of 1919, and takes in only those roads conforming to the standard of construction.

NUMBER OF VEHICLES.

	Rickshaws	Carts	Ox-wagons	Horse-wagons	Carriages	Automobiles	Total
End of 1911...	1,217	1,804	38,337	585	110	2	42,055
End of 1918...	4,811	18,236	63,294	2,614	231	(End of 1920) 447	89,633

Street Improvement

Towns in Chosen for the most part contain narrow, dirty and crooked streets, causing great inconvenience to communications, and sanitary and fire-brigade arrangements, and naturally hindering their development, so of late years much has been done for their improvement by straightening, grading and widening existing streets, and by constructing new ones as circumstances required.

Keijo is the capital of Chosen and quite different in scale and plan from other towns, so it was decided to conduct street improvement in it at national expense, and 43 of its streets were selected for improvement, of which 13 were completed at a cost of Y.3,000,000 in the eight years from 1911 to 1918. The most important of these were made 12 to 15 *ken* in width and provided with pavements, and where the traffic is heaviest the macadamized surface is tarred, while the other roads were made not less than 8 *ken* in width, thus bringing about an extraordinary change in the appearance of the city.

The second program takes in nine streets, the budget estimate for which is Y.2,400,000 spread over six years from the fiscal year 1919, and this is now in the course of execution.

Other towns marked out for street improvement were Heijo, Taikyu, Shingishu, Fuzan, Chinnampo, Seishin, Moppo and Genzan, towns in which provincial offices are situated, and certain others of some importance. The expenditure on these is defrayed out of the local revenues, sometimes assisted with a subsidy from the national treasury, and not a few of these towns have already carried out the projected improvements.

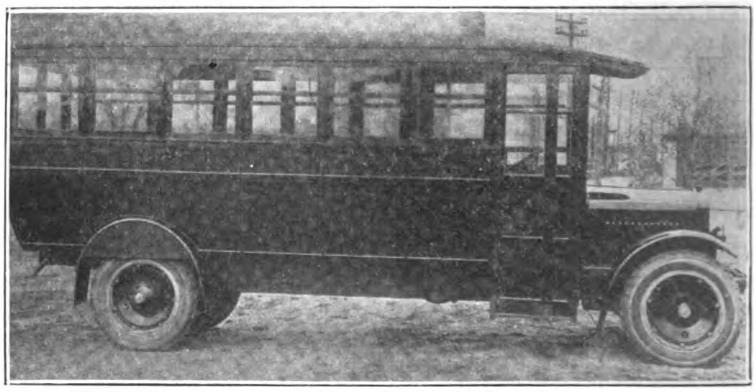
Chosen is far from being as developed as Japan proper, but, as its future development will be comparatively rapid, it is necessary to lay down the fundamental plan for street improvement now, and make the various connected arrangements conform to it, therefore the government-general has incorporated in the budget for the fiscal year 1921 an item for investigation regarding city improvement, and has begun the work in four large cities, viz., Keijo, Fuzan, Taikyu and Heijo.

A proper sewerage system is a very necessary aid to sanitation, so its establishment is being carried on side by side with street improvement. The city of Heijo is spending Y. 580,000 in the 11 years from the fiscal year 1913 to 1923 on this work, and Keijo, Y. 1,600,000 between the fiscal years 1918 and 1924. Part of the money thus expended is provided by the national treasury and part by public bodies.

Standardized Passenger Bus Introduced by Large Lorry Manufacturer

PASSENGER transportation by motor bus has grown to such large proportions during the past few years, and there are such great numbers of these vehicles in use at the present time, that a large American motor lorry manufacturer—The General Motors Truck Company, of Pontiac, Michigan, U.S.A.—has felt the advisability of introducing a completely standardized passenger bus, capable of accommodating passenger transport needs of a wide variety.

This Company makes the point that passenger buses to-day are almost universally built upon a regular commercial car chasiss,



New K-20 type G.M.C. Motorbus

which chassis has marked disadvantages for passenger transport service from the viewpoints both of speed and riding quality.

With this in mind, the General Motors Truck Company began at the very foundation of things when designing their new model K-20 passenger bus, by constructing a special chassis on which the passenger body is built.

This special chassis is a happy medium between the great strength with corresponding rigidity of the regular lorry chassis, and the speedy and easy riding, but somewhat light typical passenger car chassis.

The K-20 special bus chassis has power and speed to spare, but at the same time its chassis units are very sturdily built, and there is a large margin of safety in every part of its construction.

Notable features of this K-20 chassis are its speed of 30 miles per hour with a normal engine R.P.M., its exceptionally large area

of brake service—more than is built into the average two ton lorry—its sturdy rear-end construction with radius rod bracing, and its surplus of power for every emergency.

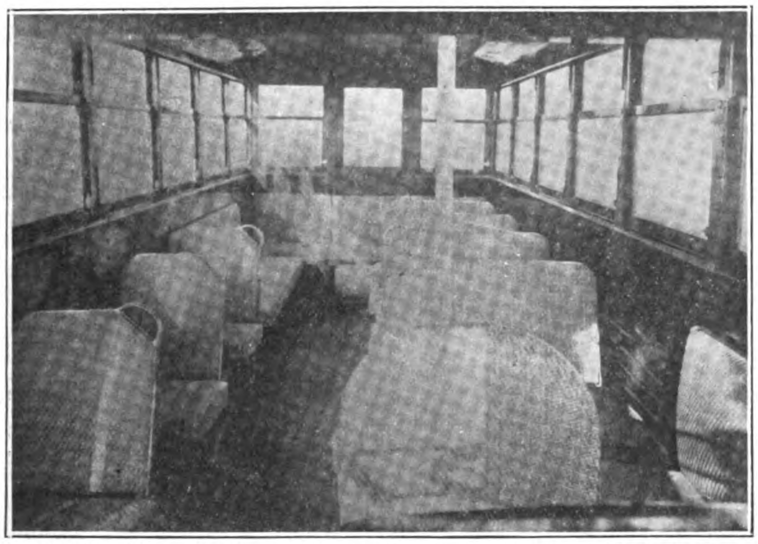
Steel disc wheels practically eliminate wheel breakage possibilities. Large pneumatic cord tires insure easy riding on the part of passengers, and these tires are fitted with all-weather tread to minimize skidding.

Each detail of the special K-20 chassis has been planned with the points of quietness and lack of vibration kept always in mind. The engine is silent in operation, and the transmission gears are accurately—cut and well—fitted. The clutch is an oversize unit of the dry-plate multiple disc type, and is quiet, smooth and positive in action.

On the long 178-in.—4.52 meter—wheelbase of the K-20 bus chassis, the General Motors Truck Company are building a body that is the result of a careful study of passenger transportation needs. The seats, of rattan, are extremely easy to ride on, and in this they are aided by the long and elastic springs that are utilized in the K-20 chassis.

Seat-backs are shaped to conform to the body, and are set at a comfortable angle. Bronze hand-holds are set in the corners of all cross-seat backs. The driver's seat is of the bucket type, and is designed especially for comfort.

General Motors Truck Company officials foresee a large market for this special passenger bus built on their new K-20 chassis. With the rapidly opening field for passenger transportation by motor vehicle in practically every country in the world, the demand for this standardized bus—designed from the ground up especially for passenger transportation use—should fully come up to the expectations of its builders.



Interior view showing seating arrangement of the new K-20 type G.M.C. Motorbus

Motor Bus Services in Shanghai

A Comprehensive System to be Planned

MOTOR bus services are under consideration by the Shanghai municipal council.

It is pointed out in the *Municipal Gazette* that under present conditions each application for permission to run a motor omnibus service is considered on its merits without any regard to its bearing on any comprehensive motor bus system, *i.e.*, the application is considered from the point of view of the particular route concerned rather than from the point of view of such route as a component part of a bus system serving the whole settlement and municipal roads outside the settlement; and that if this policy is continued the settlement and municipal roads outside will in due course be served by a conglomeration of short route services covering only the most paying sections of roadway, since naturally the promoters of such services will pick routes that pay best and leave others alone. The result, it is suggested, will be inefficient service and intensification of present traffic congestion and difficulties, and it is submitted that it is of the utmost importance that the whole of the settlement and outside settlement roads should be carefully studied as soon as possible with a view to mapping out a definite system of motor bus routes to cover the whole and that as soon as such routes have been mapped out, publicity should be given to the fact that the council is prepared to license buses covering such routes at the licence fees stated and calling for applications.

As a preliminary a large scale plan has been prepared showing the settlement and outside settlement road system with road widths marked thereon and the complete rail and railless tram system present and contemplated also shown, and members now concur that a special meeting of the council should be held with the commissioners of police and public works in attendance and that a decision should then be reached as to the road on which the council will be prepared to allow motor buses subject always to the stipulation that no service will be permitted until the road surface is pronounced by the commissioner of public works to be suitable.

Following such meeting the commissioner of police will be called upon to prepare a schedule of bus routes designed to cover the whole of the approved roads, having regard to traffic requirements. This schedule will later be submitted to the council for approval and for the fixing of the route mile licence fee to be paid in respect of each particular route in addition to the licence fee of Tls. 100 per quarter per motor bus provided for in the licensing schedule approved at the last meeting of ratepayers.

Japan Notes

Automobiles in Japan

ACCORDING to an investigation of the department of home affairs, at the end of 1921 there were 12,117 automobiles in Japan. This is approximately only one-thousandth of the number in use in the United States, where there is one automobile for every 10.3 persons in the country.

The Japanese census of population made in September, 1920, showed a population of 55,963,053. This has naturally increased and the population at the end of 1921 is in excess of this figure. But using the census figures as a basis of calculation, there is in Japan one automobile to every 4,619 persons.

Despite the hard times of the past two years the number of cars at the end of 1921 was 2,119 greater than at the end of 1920. This is an encourging sign of the development of industry.

The greatest number of cars is in Tokyo, Osaka, Yokohama, Kobe and Kyoto follow in order of number in use. The least number is in Okinawa prefecture, the Luchu islands, where there are only 20 cars.

The Yanase Automobile Co., Ltd., has recently sold 18 Cadillac trucks to the imperial household department. It has also sold the Tokyo City Bus Co., Ltd., 100 Clydesdale trucks. These trucks are in increasing demand in Tokyo.

Tokyo municipality has bought several high-grade G.M.C. trucks, and the railway department has also ordered several 2-ton trucks.

The Kobe city bus line bought more than 700 Chevrolet cars, and the army and navy departments have been using the "Excelsior" motor-cycle more and more.

The Moji office of the imperial railways has recently begun operating motor-driven baggage trucks between the quay and the railway station, with such success that an order for a considerable number of new trucks will soon be given to an American firm.

It is reported that the station at Shimonoseki will also be equipped with these trucks.

Humber

STANDARD MODELS.

11.4 h.p. 2-Seater (with double Dickey Seat)
11.4 h.p. Coupé (with double Dickey Seat)
11.4 h.p. 4-Seater 15.9 h.p. 5-Seater
11.4 h.p. Saloon 15.9 h.p. Saloon

HUMBER LIMITED.

Works:

COVENTRY, ENGLAND.

Export Dept.:

Humber House, 94 New Bond St.,

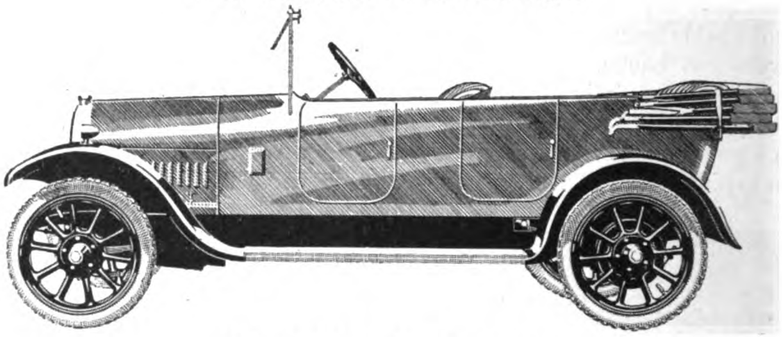
LONDON.

DISCRIMINATION

AMONGST discriminating motorists the Humber is known the world over. Humber is a pioneer name and to-day stands for all that is luxurious and best in car construction. Motoring experts are unanimous in their opinions of the many sterling qualities of the Handsome Humber range.

All Humber Cars are fitted with detachable steel Artillery Wheels suitable for all climates. All open models are fitted with the Humber All-weather Hood (with side curtains opening with the doors) which provides for complete protection even in tropical rains.

Write to-day for our Art Catalogue



11.4 p.h. All-weather Four-Seater

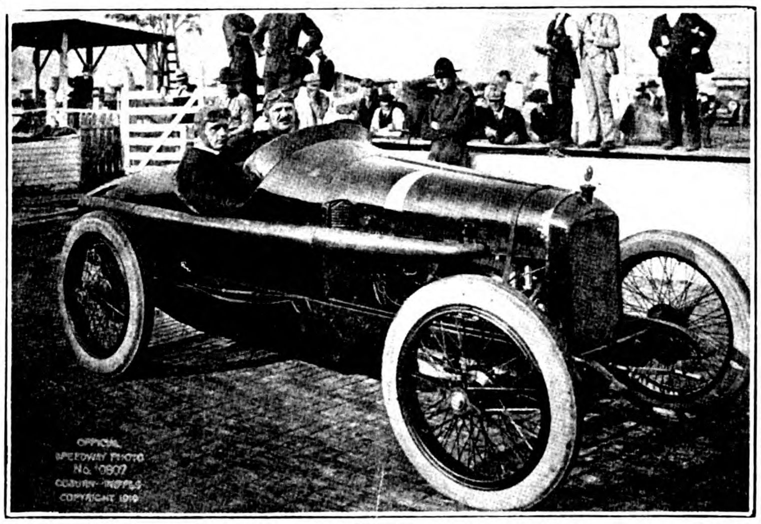
Graphite Transmission and Differential Grease No. 677

We are proud to state that No. 677 has justified the labor and expense devoted to a really intelligent effort to produce an ideal gear lubricant. It has successfully stood the test of years. There is nothing like it on the market. It is the grease the "Speed Kings" use.

No. 677 is graphited grease of medium density that flows over the gears like an oil, yet possesses the peculiar property of not settling when the gears are not in motion. It reaches all the bearings and provides a graphite coating that prevents wear, reduces friction and causes cool running at all times. No. 677 remains unchanged in hot or cold weather. It will last far longer than the best plain grease.

No. 677 is recommended for transmissions and differentials, except those designed for light oil lubrication. The consistency is about that of heavy gear oil. It is also the most satisfactory lubricant for electric gear shift mechanisms, the reverse gears of power boats, and for change-speed gear boxes of motorcycles.

Sold in one, five and ten pound tins. Larger packages if desired.



"Many times Dixon's Graphite Automobile Lubricants have pulled my car through a trying race without lubricating difficulty."—LOUIS CHEVROLET.

Joseph Dixon Crucible Co.

Established, 1827

For Prices, Information, etc., communicate with

HENRY KATTEN

22 KIUKIANG ROAD

SHANGHAI, CHINA

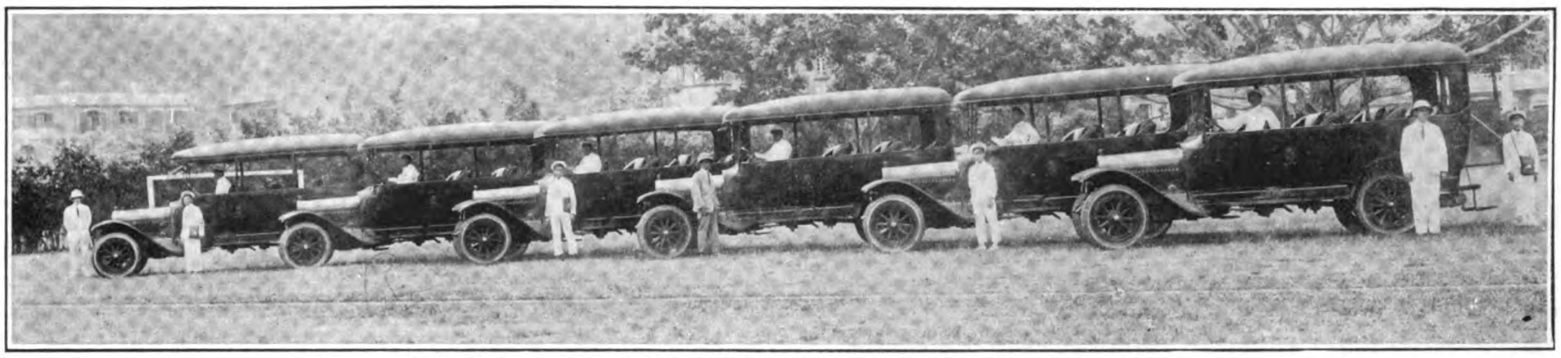
Graphite Cup Greases

Cup Greases containing fine flake graphite reduce friction to a minimum. By using these high-grade graphited greases, bearings soon acquire the well-known graphite polish that eliminates friction and causes easy running. Used in all grease cups, wheel spindles, etc.

Dixon's Graphite Cup Grease No. 3 is recommended, except in warm climates, where No. 5 is more suitable. The consistency of each grade changes but little under wide temperature variation.

The importance of attending to the numerous small bearings and moving parts of cars is frequently overlooked. Wherever you see a grease cup don't think it is put on as an ornament, but give it a turn once a day or once a week according to the requirements. Don't forget to keep the cups filled with grease.

Sold in one, five and ten pound tins. Larger packages if desired.



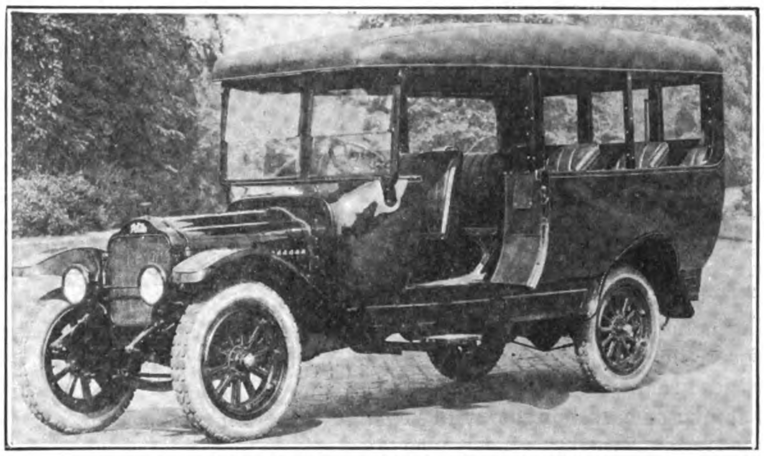
Fleet of six specially-desigued "White Buses" of the Hongkong Hotels, Ltd.

White Buses, Pride of Hongkong Hotels

EVERY visitor to the Far East wants to see Hongkong with its fine harbor, said to be one of the most beautiful in the world. This island colony of Great Britain sets in the "fragrant waters" (literal translation of the Chinese name Hongkong) at the mouth of the West River in South China.

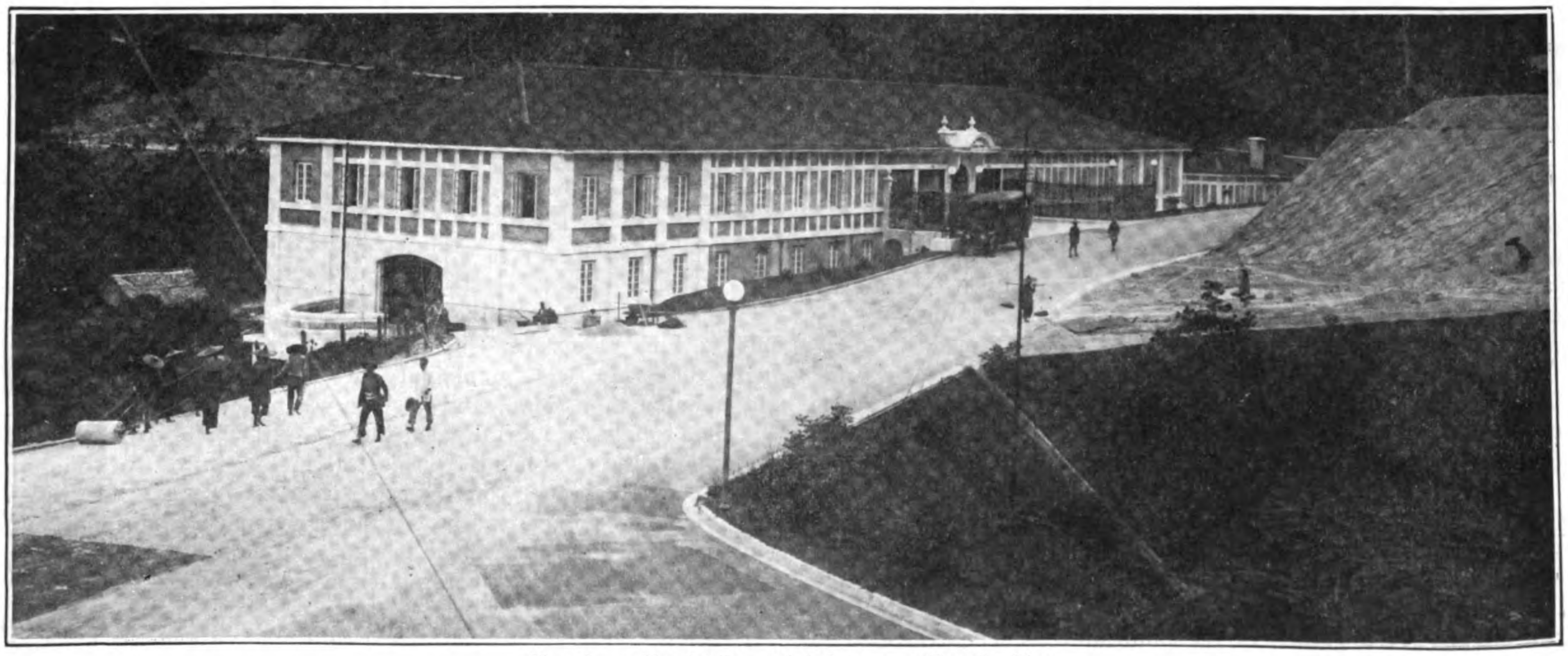
There is no other place in the East where civic improvement has gone so far as in Hongkong, particularly in the building of fine motor roads. Chief amongst the attractions of the colony is the Repulse Bay Hotel which has been built on the opposite side of the island from the city of Victoria. Known as the 'Mentone of The East' with its setting on the side of a hill overlooking the bay, it is undoubtedly the most delightful spot between San Francisco and Suez.

In order to facilitate the transportation of guests the Hongkong Hotel Company have installed a fleet of White buses which operate between the city and Repulse Bay. These buses were designed especially for this service and built by The White Company at their plant in Cleveland, Ohio, U.S.A. The specifications of the chassis conform to the latest ideas for bus work, having a fifty horse-power motor, and the correct gear ratios for negotiating the sharp curves and severe grades of the route. The body with a capacity of twelve passengers follows the design and finish of the finest touring cars. The upholstery is genuine leather. Every convenience is provided such as electric lights, bell signals, etc.



One of the Hongkong Hotels Fleet of White's

The service rendered is greatly appreciated not only by tourists, but by the residents of the colony as well. This has been indicated by the patronage given during the summer by those desiring to reach the bathing beach at Repulse Bay. The running time for the buses is the same as that of touring cars.



Hongkong Hotels' Beautiful Garage at Repulse Bay

Motor Vehicles a Prime Utility in Chosen

By Trade Commissioner William I. Irvine

NINETY per cent. of the 800 motor vehicles in Chosen are low-priced American makes, and 75 per cent. of these are used as motor busses in supplementing the railways of the country. The government recognizes the value of motor vehicles in developing the resources of Chosen ; as rapidly as roads are opened, bus lines operate over them under franchises granted by the government at fixed tariffs. Most of the remaining motor vehicles are used by missionaries—hardly more than a dozen Koreans owning cars for private use.

Practically all the roads in the country are under the supervision of the government general, which Seoul, the capital, and in Fusan, the principal seaport, are wide and unsurfaced, and during the greater part of the year permit driving without undue hardship.

Larger Market in the Near Future

The sale of motor vehicles in Chosen is at present seriously handicapped by poor business conditions ; but despite the recent imposition of heavy import duties, there are indications of an early improvement in the market as a result of the steady increase in road mileage noted above and of the more widespread recognition of the value of automotive transportation. The market is further limited by the fact that the small wealthy class of Koreans has not yet overcome the fear of showing wealth lest it mean greater taxation by the government.

As the automotive market in Chosen is gauged by the crops, the country being almost entirely agricultural, it will be limited for a number of years to motor vehicles that fall within the $1,500 margin, although the low buying power of the people is rising with the introduction of scientific methods of farming. The demand should be steady for the next few years, however, for between 200 and 400 vehicles per year to cover both new cars and replacements, the latter being based on the average four-year life of a motor vehicle under present operating conditions. There are few artificial handicaps to the sale of motor vehicles in Chosen, and the recent increase in taxes and import duties are offset by the lowering prices of American makes. Present stocks of cars bought at high prices are very small, and these, moreover, were imported under the old duties. Taxes are 120 yen per year regardless of horsepower or size, as compared with the old figure of 50 yen. Import duties are 35 per cent. on passenger cars and trucks, 25 per cent. on parts, and a flat rate of 100 yen for motor cycles, regardless of cost.

Business Practices

Dealers come into direct contact with the buyers, the chauffeur evil so prevalent in Japan not being tolerated by automotive dealers in Chosen. It is the general practice to demand cash sales with Koreans, although credit terms are sometimes given to foreigners ; the latter are usually missionaries who require cars to get over their territory. Prices are generally in keeping with laid-down costs and average about 75 per cent. above the sales price in the United States.

Dealers do not maintain separate service stations for repairs, although some carry spare parts. Repairs are made by a machine shop in Seoul, which has a fairly adequate supply of machine tools ; it is quite capable of making major repairs and, in emergencies, of making essential parts. Very little advertising is done by dealers, owing to the high rates demanded by the Japanese newspapers. Occasional announcements of new representations are made, but dealers prefer to circularize small folders. Advertising literature in English has a very limited use ; it is suggested that advertising allowances be given to dealers, on condition that it be expended on circular matter in Korean or Japanese script.

Many Dealers Inactive—Credit Terms and Shipment

The centre of motor-vehicle distribution is at Seoul, where all the dealers and repair facilities are located. At the present time there are less than a half-dozen dealers interested in the sale of motor vehicles in Chosen, although many more are supposed to be acting as representatives. American manufacturers make a mistake in granting Japanese representatives the territory of Chosen unless the Japanese company can actually prove that it is represented in the country. Only two firms with headquarters in Japan were found to be represented in Seoul. Better results will be obtained by placing Chosen on an independent basis.

Credit terms would undoubtedly have to be given in the event direct representation were placed in Chosen, as the men in that country who are interested in automotive products are limited in capital. Dealers at present are paying from 10 to 11 per cent. interest on loans. Terms granted in other lines are 90 days' sight draft, with documents delivered on acceptance.

There are no regular steamship lines giving direct service between American ports and the Korean ports of entry, Fusan and Chemulpo (Jinsen). As goods imported through Japan must pay an additional 8 per cent. duty, unless shipped in bond, it would be best to send them direct to Seoul by a bill of lading calling for transhipment at Kobe, Japan. Automotive vehicles should be carefully packed and specially braced when intended for direct shipment to Chosen, as the unloading facilities at the above ports are very bad.

Types of Motor Vehicles in Demand

The demand for passenger cars is limited to touring types, including chassis and body. Local body building is limited to special touring-bus bodies for a light popular-priced American car. The demand for trucks is chiefly for those of 1 and 1½-ton capacities, owing to the frail bridges of the country. Most of the trucks in use are owned by the government and the railroad. Merchants and minor manufacturers are beginning to use light trucks in the towns. The market for motor cycles will not increase to any extent, as former owners have found them too uncomfortable over the rather rough gravel roads and are going in for cars. The accessory market is limited to utility articles. The tire market, formerly controlled by British goods, is now in the hands of Americans ; there is a steady demand for tires and tubes, as the tires commonly last less than 3,000 miles. Dealers are advocating the use of oversize cords.

Electric Freight Cars to Supplement Motor Cars in Tokyo

Electric freight cars and non-track street cars are to be put on the Tokyo streets shortly. Fifty cars for that purpose are being built at the municipal car manufacturing works at Hamamatsu-cho, Shiba, and will be completed within this year.

The freight cars are divided into two kinds, viz., covered, and uncovered, and each has a transportation capacity of five tons, an increase of about four tons over that of motor wagons. Fresh fish which is now being carried by ten motor vans every morning from Sumidagawa to the central fish market, can be transported by two or three electric freight cars. Moreover, the charges are lower than those of the motor vans.

The non-track street cars have rubber-tyres and the existing wire will be utilized.—*Mainichi.*

The Airship of the Future

"THE airship of the future will be of all-metal construction, which will be of fundamental assistance in the development of dirigibles for world-wide commercial use in aerial transportation" according to Herman T. Kraft, chief aeronautical engineer of the Goodyear Tire and Rubber Company.

Two factors must be considered above all others in the construction of airships of any kind, namely safety and durability. There must be absolute protection against structural failures as well as against fires. As long as airships are constructed of inflammable materials, there will always be some danger of fire, especially with the use of hydrogen gas.

300 cu. ft. Goodyear Free Balloon

Uniform distribution of strength, which is the major basis of safety, is exceedingly difficult to obtain even in a rigid airship because of the very complicated calculations necessary to be sure of safety, since we have to figure unknown factors and allow for them in every airship we build. It will be possible with an all-metal ship to make those calculations much more exact than has hitherto been possible, due to the reduction of the number of small riveted parts which have formerly been multitudinous.

The entire surface of the ship will be of metal, thereby assuring greater durability and reduction of fire hazard. Tests have been made which indicate that even hydrogen ignited on the surface of an all-metal container will burn freely without heating up the metal, so that there would be no danger of the envelope being consumed by the flame.

Unquestionably the building of such a ship would be a mammoth undertaking, but with the present engineering knowledge available its construction would be entirely practicable. Indeed it has been attempted before, so far back as two decades ago, and flights were actually made with an all-metal ship with conical ends and cylindrical body, but the ship was not a success, chiefly because engineering knowledge had not progressed sufficiently in aeronautic, and proper construction materials were not available.

Aluminium sheeting would doubtless be the metal employed with strips of very flexible non-inflammable material or wire lacing interpose at various points to take care of the flexing of the envelope while in flight.

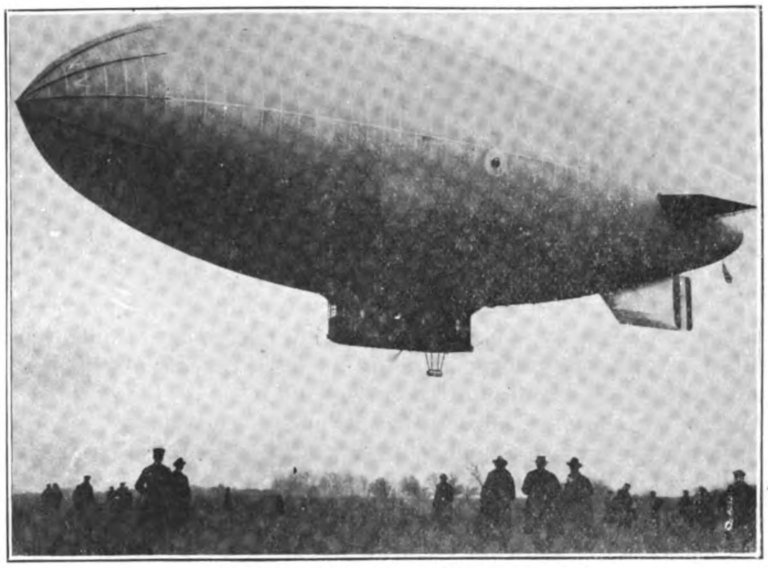
Approximately 1,000,000 cubic feet capacity, with a theoretical length of 350-ft. and a maximum diameter of about 75-ft., would be the proper size of ship to make to prove its practicability.

In any consideration of all-metal ships, the question of gas-tight seams has generally been a bugbear, but it has now been conclusively proven that the seams in such a ship can be made gas-tight, especially in a container carrying low pressures.

The actual building would be somewhat of a problem even in the modern workshops and hangars of the Goodyear company, but by using airbags to keep lifting the ship progressively while under construction, and erecting superstructures in the hangars the riveting, lacing and assembling could easily be handled.

The rigidity of the structure which would have some degree of flexibility, would eliminate many of the structural difficulties in rigid airships of the present design.

The first practical all-metal ship will be the key which opens the gates, hitherto barred because of lack of positive assurance of safety and durability, to a real commercial use of the dirigible in air transportation. A striking characteristic of our day is the rapidity with which people accept the marvellous inventions which but yesterday seemed to be the delusions of cranks. We have long ceased to wonder at radio and accept without question every news story of its possibilities. There is every indication that it will be the same with aeronautics, with the advent of the first practical all-metal airship, which can be assembled with greater speed and less cost than ships of the Zeppelin type. Undoubtedly a ship of the construction features pointed out, would practically abolish the dangers from fire and structural breaks, and have all the safety of a modern ocean liner.



Latest Goodyear Blimp

Failing to obtain the necessary grant for the development of her air service, Siam is holding a million tical lottery as an alternative method of getting things aerial going. Fifty thousand pounds will be distributed in prize money, and the air service will benefit by the same amount. The first prize will be £10,000.

Siam's air force consists of 115 airplanes and a staff of 650. There are five airdromes and 25 prepared landing places in the country.—*Flight.*

RED HEMATTIE ORE

For disposal 300 tons Low Grade, 40 per cent. Metallic Iron, Sulphur and Phosphorus not exceeding .04 per cent. Suitable for Mints.

Offers solicited for immediate delivery ex Wharf, Shanghai. Open to inspection. Apply:—

WILLIAM JACKS & CO.,
1 HONGKONG ROAD,
SHANGHAI

Manchuria Railway

Operating economies enabled the South Manchuria Railway to report net profits of Y.31,386,000 ($15,693,000) for the year ended March 31, or an increase of Y.3,990,000 as compared with the preceding year. The road's gross earnings totaled Y.147,100,000 and expenditures Y.115,714,000. The Chosen line showed a profit of Y.606,000 as against a loss of Y.1,070,000 in the previous year. Half of those profits go to the South Manchuria Railway.

During the year the company expended Y.45,000,000 in improvements. On new equipment and extension of double tracking Y.14,000,000 was disbursed; wharves, Y.4,000,000; mining properties, Y.10,000,000; barges and tugboats, Y.910,000; steel mills, Y.1,310,000; electrical enterprises, Y.3,000,000; gas plant, Y.500,000.

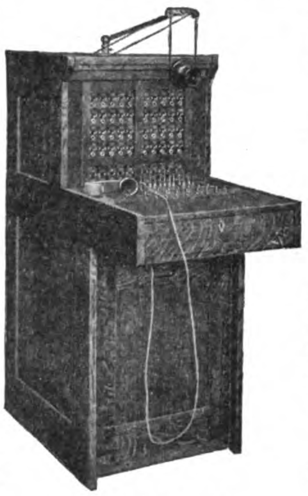
The directors authorized the regular 10 per cent. dividend to public shareholders.

More than fifty cars of different nationalities took part in the speed tests held by the Automobile Club of Sweden at Jonkoping. Good results were obtained in the hill climb, particularly by the small cars. The fastest of these was a 1460 c.c Fiat driven by Gisiko, who beat all comers, the second in the same class being Stuernsward on a similar machine. Ohlsson on a 3970 cc. Voisin was third, followed by Andresenz on a 2930 c.c Essex, Eklund on a 3970 cc. Voisin and Widner on a 2550 cc. N.A.G.

The following are the official results :—

Class 1. Fiat, Gisiko ; Fiat, Stuernsward.
Class 2. N.A.G., Widner ; Overland, Wiken.
Class 3. Essex, Andresenz ; Buick, Nas.
Class 4. Stephens, Fogelqvist ; Steyr, Melter.
Class 5. Voisin, Ohlsson ; Voisin, Eklund.
Class 6. Lancia, Brambeck ; Cadillac, Wiessner.
Class 7. Packard, Gislow ; Hispano-Suiza, Fraenkel.

Kellogg Magneto Switchboards for Profitable Operating



Code No. 11 B

No. 11 B—50 line capacity, wired as follows:
50 lines, combined drops and jacks (5 per strip) as specified.
8 cord circuits, single or double supervision with or without repeating coils, at specified.
1 operator's set, suspended or breast plate type transmitter as specified.
1 Generator Circuit.
1 Night Alarm.

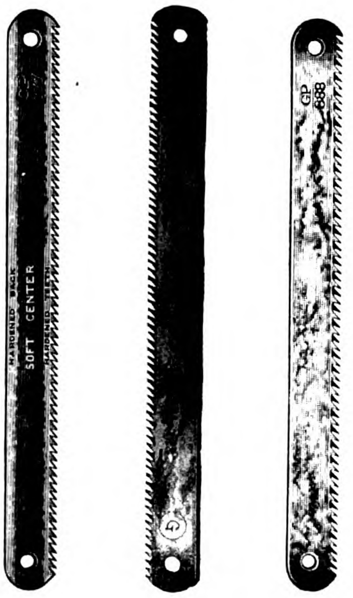
No. 12 B—100 line capacity, wired as follows:
100 lines, combined drops and jacks (10 per strip) as specified.
12 cord circuits single or double supervision with or without repeating coils, as specified.
1 Generator Circuit.
1 Night Alarm.
1 operator's set, suspended or breast plate type, transmitter as specified.

Prompt shipments on all orders
Use is the Test

KELLOGG SWITCHBOARD & SUPPLY CO.
FAR EASTERN BRANCH
No. 62 KIANGSE ROAD, SHANGHAI
Factory and General Offices, Chicago, Ill., U. S. A.
Builders of High Grade Telephone Equipment for 25 Years

GOODELL-PRATT

1500 GOOD TOOLS



HACK-SAW BLADES

UNIFORM IN QUALITY

GOODELL-PRATT Hack-Saw Blades are made of the best grade of sheet steel that we can buy for the purpose because Goodell-Pratt blades are made to do useful work—not to pass freak tests.

Extreme care is used in tempering Goodell-Pratt Hack-Saw Blades. They are rigidly inspected after every step in their manufacture. Every blade is as nearly perfect as good material, skilful workmanship, and correct designing can make it.

There is a Goodell-Pratt Hack-Saw Blade for every one of the many uses that fall between the cutting of soft metal and the sawing of high-carbon steel.

Quality is the first consideration in the making of a Goodell-Pratt Tool. Every one of the 1,500 Goodell-Pratt Tools is a model of the toolsmith's art.

GOODELL-PRATT COMPANY *Toolsmiths* Greenfield, Mass., U.S.A.

JOHN WALKER & SONS, LTD., SCOTCH WHISKY DISTILLERS, KILMARNOCK, SCOTLAND.

Sole Agents:

Caldbeck, Macgregor & Co., Ltd.

WINE & SPIRIT MERCHANTS

ESTABLISHED 1864

4 FOOCHOW ROAD

Phone Central 7216 (4 Lines)

NIPPON MENKWA
KABUSHIKI KAISHA

(THE JAPAN COTTON TRADING CO., LTD.)

LARGEST IMPORTERS AND EXPORTERS
IN THE FAR EAST

COTTON
COTTON YARN
COTTON PIECE GOODS
RAW SILK
WOOL
GENERAL COMMISSION MERCHANTS

Established 1892

HEAD OFFICE: No. 10 2-Chome, Nakanoshima, OSAKA, JAPAN
SHANGHAI OFFICE: 8 Hankow Road
TIENTSIN OFFICE: 42 Rue de France, French Concession

Capital Subscribed	Yen 50,000,000.00
Capital paid-up	Yen 20,250,000.00
Reserve Funds	Yen 26,825,000.00

MATAZO KITA, Esq., *President*
ATUSHI YAMADA, Esq., *Vice-President*

Directors :

K. SUYEYOSHI, Esq. G. IMAMURA, Esq. R. NAKAMURA, Esq.
H. OHOKA, Esq. T. SHIKATA, Esq. K. KUSUMOTO, Esq.
T. YASUI, Esq.

BRANCHES: Semba (Local), Dairen, Shanghai, Hankow and Bombay
AGENCIES: Kobe, Yokohama, Tokyo, Seito, Tientsin, Newchwang, Tiehling, Changchung, Harbin, Hongkong, Calcutta, Karachi, Rangoon, Alexandria, Liverpool, New York and Buenos Aires
SOLE BUYING AGENCY IN U.S.A.: Japan Cotton Trading Company of Texas, Fort Worth, Texas
SOLE BUYING AGENCY IN COREA: Corea Cotton Trading Company, Limited
FACTORIES: Cotton Press at Hankow, Cotton Gins and Presses in India

HOTELS STATLER

BUFFALO
450 Rooms 450 Baths

CLEVELAND
1000 Rooms 1000 Baths

DETROIT
1000 Rooms 1000 Baths

ST. LOUIS
650 Rooms 650 Baths

In five big cities—centers of American industry and travel—there are Statler Hotels.

They are good hotels, successful hotels that guarantee your satisfaction.

In each city we believe that the Statler is the *preferred hotel* of a majority of the discriminating travelers who come to that city from across the seas.

One of the reasons for that preference is the fact that the Statlers are complete, safe, and extra-comfortable hotels; there are other reasons in the thoughtfulness and courtesy of the service they render travelers.

Every Statler bedroom has a private bath, circulating ice water, and many other unusual conveniences. A morning newspaper is delivered free to every guest-room.

Remember that any of the offices of Messrs. Thos. Cook & Son can give you any information you require about these hotels, or can make reservations for you. Or you can make your own reservations by writing direct to the hotels.

NEW YORK
Hotel Pennsylvania

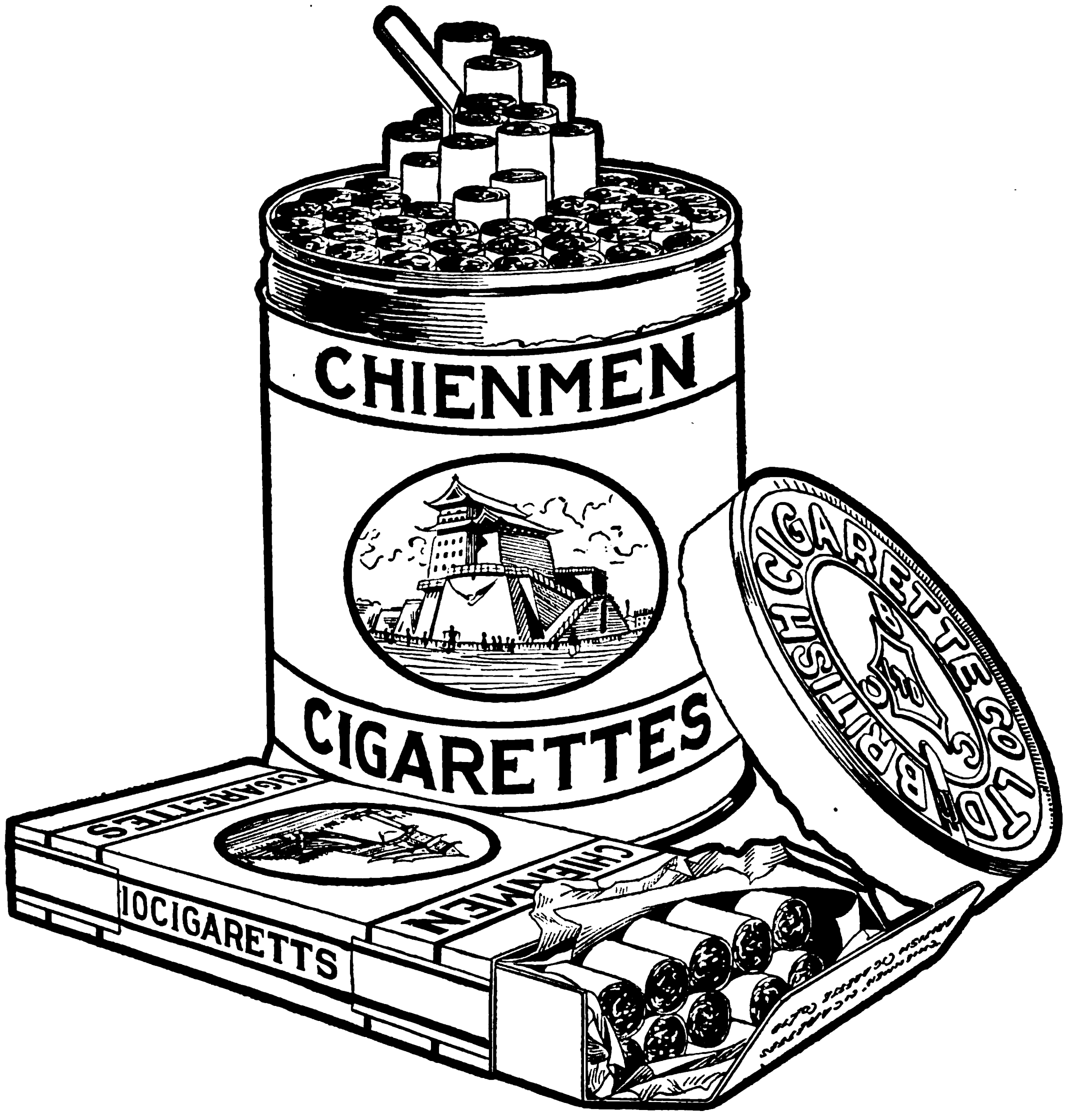
This Statler-operated hotel in New York is HOTEL PENNSYLVANIA—so named because it is opposite the Pennsylvania station. Not only is it the largest hotel in the world (2,200 rooms, 2,200 baths), but it is of a character throughout, which places it in the front rank of the great hotels of the world that are most famous among travelers who want the best there is. Be sure that your hotel reservation for New York City is at HOTEL PENNSYLVANIA, whether you require a single room or a suite.

The Largest Hotel in the World

A new Hotel Statler (1100 rooms, 1100 baths) is now building in Buffalo, to open early in 1923; 500 more rooms to be added later.

CHIENMEN

Cigarettes

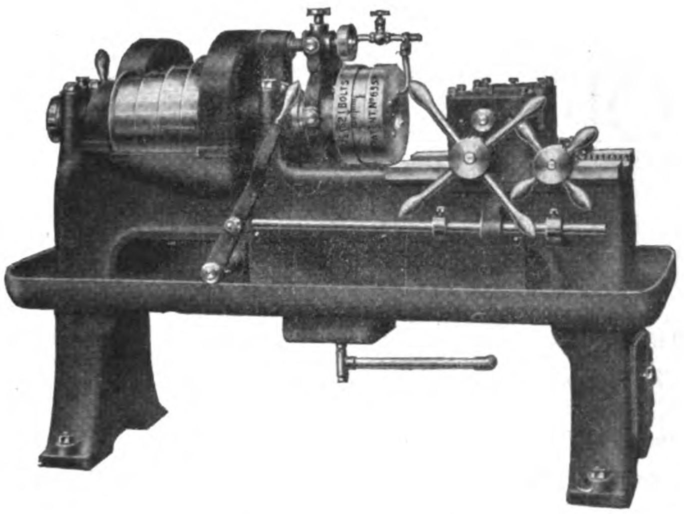


A brand well known to the "High Grade Cigarette Smoking Public" of China.

BRITISH-AMERICAN TOBACCO CO. (CHINA), LTD.

Distributors

Heap's Patent Screwing Machines



are made in all sizes, and suitable for dealing with all classes of work.

The illustration opposite shows our 2in. Patent Automatic Bolt Screwing Machine which is one of a complete line of Single and Multiple Head Machines specially designed for use wherever large quantities of Bolts have to be dealt with in the most expeditious and economical manner.

We will gladly advise you as to the most suitable machine for your particular class of work.

Catalogue free on request.

JOSHUA HEAP & CO., LTD.,

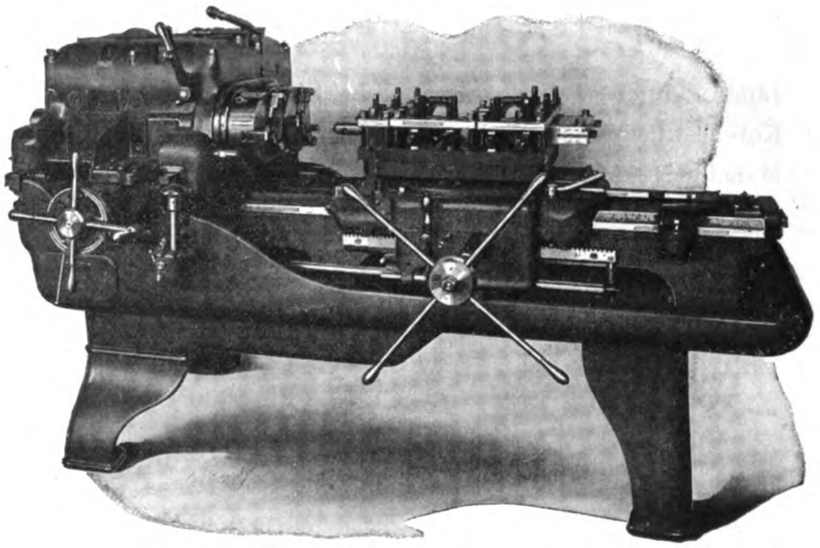
ASHTON-UNDER-LYNE, ENGLAND.

TWO TO ONE

TWO Spindles, TWO sets of tools, TWO pieces of work.

ONE turret, ONE machine, ONE operator

Why wasn't it done before?



Double Spindle Hartness Flat Turret Lathe

Jones & Lamson Machine Company

9-10 Water Lane, London, England
Cable Address: "Terretorum" London

Springfield, Vermont, U.S.A.
Cable Address: "Turret" Springfield, Vt.

THE BANK OF CHOSEN

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor : S. Minobe, Esq.
Deputy-Governor : T. Kano, Esq.

Directors :

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT: TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY:

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE:

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL - - - - - - - U.S. $5,000,000
SURPLUS AND UNDIVIDED PROFITS - - 10,458,137

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK

LONDON OFFICE: 36 BISHOPSGATE, E.C.

LYONS OFFICE: 27 PLACE TOLOZAN

SAN FRANCISCO OFFICE: 232 MONTGOMERY STREET

BRANCHES:

CHINA
- SHANGHAI
- PEKING
- TIENTSIN
- HANKOW
- HARBIN
- HONGKONG
- CANTON

DOMINICA
- SANTO DOMINGO
- SANCHEZ
- SAN FRANCISCO
- SAN PEDRO
- SANTIAGO
- PUERTO PLATA
- BARAHONA
- LA VEGA

INDIA
- BOMBAY
- CALCUTTA
- RANGOON

JAPAN
- YOKOHAMA
- KOBE

JAVA
- BATAVIA
- SOURABAYA

PANAMA
- PANAMA
- COLON

PHILIPPINES
- MANILA
- CEBU

SPAIN
- BARCELONA
- MADRID

STRAITS SETTLEMENTS
- SINGAPORE

We are also able to offer our Customers the services of the Branches of the National City Bank of New York in the principal countries of South America, Central America and in the West Indies.

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current Accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

H. C. GULLAND, *Manager*.

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital ... ... **Frs. 72,000,000**
Reserves ... ... **" 70,000,000**

HEAD OFFICE: 96 BOULEVARD HAUSSMANN, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Nouméa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

JUGO GINKO, LIMITED

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugo Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-up Y. 49,750,000 Reserve Funds Y. 23,900,000

***President*: The Hon. Iwao Matsukata *Vice-President*: Masayasu Naruse, Esq.**

***Managing Directors*: Yutsuha Sato, Esq. and Kanesato Aiko, Esq.**

***Head Office Manager*: Sei Usagawa, Esq.**

***Head Office*: No. 6, 7chome, Kobiki-cho, Kyobashiku, Tokyo.**

BRANCHES:

SHIMBASHI, MARUNOUCHI, GOFUKUBASHI, TOHORISANCHOME, KAKIGARACHO, NINGYOCHO, RYOGOKU, FUKAGAWA, KANDA (TOKYO). OSAKA, SENBA, TAMATSUKURI, NISHI, KUJO, MINAMI, NAMBA, TENNOJI, KITA, TENGACHAYA (OSAKA), KOBE, SAKAEMACHI, FUKIAI, HYOGO (KOBE). KYOTO, NAGOYA, SAKAI, WAKAYAMA, NISHINOMIYA, OKAYAMA, HIROSHIMA, SHIMONOSEKI, FUKUOKA, KUMAMOTO, KAGOSHIMA, SENDAI.

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD. LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD. UNION DISCOUNT CO. OF LONDON, LTD.

THE BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - - -	Yen 60,000,000
Capital Paid-up - - - - - - -	„ 45,000,000
Reserve Funds - - - - - - -	„ 9,680,000

President: KOJURO NAKAGAWA, Esq. Vice-President: SHUNROKURO MORI, Esq.

DIRECTORS:

TSUNEKICHI IKEDA, Esq.
GUNJI KAWASAKI, Esq.
TADASU HISAMUNE, Esq.
KUMEMATSU MORINAGA, Esq.
MASUMI ESAKI, Esq.

Head Office: TAIPEH, FORMOSA (TAIWAN)

BRANCHES:

JAPAN: Tokio (General Affairs Department), Kobe, Moji, Osaka, Yokohama.
TAIWAN: Keelung, Tainan, Takow, and 11 other points.
CHINA: Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

AGENTS AND CORRESPONDENTS:

In the Principal Cities and Towns throughout the World.

LONDON BANKERS:

BARCLAYS BANK, LTD. LLOYD'S BANK, LTD. LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.

TOKYO BRANCH:

No. 1, Eiraku-cho Ni-chome, Kojimachi-ku.

Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED - - - - - Yen 50,000,000

HEAD OFFICE:
MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:
TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:
NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

THE SUMITOMO GOSHI-KAISHA

OSAKA, JAPAN

OWNERS OF BESSHI COPPER MINE, COAL MINES, SILVER AND GOLD MINES, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper, Brass, Bronze and other Alloys, Solid and Drawn Steel Tubes, Nails, Etc.—Superphosphate and Composite, Manure, Sulphuric and Nitric Acid, etc.

GENERAL WAREHOUSE BUSINESS AND FORESTRY ENTERPRISES

WORKS AND DEPARTMENTS

Warehouses ... ... Osaka, Kobe & Tokyo
Mining Offices ... ... Besshi, Wakamatsu, Sapporo & Ohgayu
WORKS:
Copper Works ... ... Osaka
Fertilizer Works ... ... Niihama
Sales Departments ... ... Osaka, Kobe, Tokyo, Kure, Yokosuka, Hakata, Shanghai, Hankow and Tientsin

THE SUMITOMO STEEL WORKS, LTD.

OSAKA, JAPAN

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of Every Description for Railways, Shipbuilding Yards, Mines, Hydraulic Electric and Other Engineering Works, etc., etc.

THE SUMITOMO ELECTRIC WIRE & CABLE WORKS, LIMITED

OSAKA, JAPAN

MANUFACTURERS OF

Copper, Brass, Bronze and Nickel Wires and Strips, Trolley Wires, Insulated Wires and Cables of Every Description for Telephone, Telegraph, Lighting, Power Transmission, etc., etc.

THE SUMITOMO BANK, LIMITED

Head Office: OSAKA, JAPAN
Cable Address: "SUMITBANK"
President: Baron K. SUMITOMO
Established March, 1912
(Successors to The SUMITOMO BANK)

Capital Subscribed ... ... Yen 70,000,000
Capital Paid-up ... ... „ 50,000,000
Reserve Fund ... ... Yen 23,100,000
Deposits ... ... „ 369,000,000

Head Office: Kitahama, Osaka
City Offices: Semba, Bingomachi, Nakanoshima, Dotonbori, Kawaguchi, Tenma, Nipponbashi.
Home Branches: Tokyo (Tokyo, Toriaburacho, Fukagawa, Shinbashi, Asakusa), Yokohama, Nagoya, Kyoto (Kyoto and Nishijin), Kobe (Kobe and Hyogo), Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Wakamatsu, Kokura, Hakata and Kurume.

Foreign Branches: Shanghai, Hankow, Bombay, London, New York and San Francisco.

Agents: The Sumitomo Bank of Hawaii, Ltd., Honolulu, Lloyds Bank, Ltd., London, National City Bank of New York, New York.

Correspondents: In all important places at home and abroad.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

CHAIRMAN:

Mr. Manzo Kushida

MANAGING DIRECTORS:

Mr. Mikitaro Kikuchi Mr. Kiyoshi Sejimo
Mr. Takeo Kato

HEAD OFFICE:

No. 3 Yayesucho Nichome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

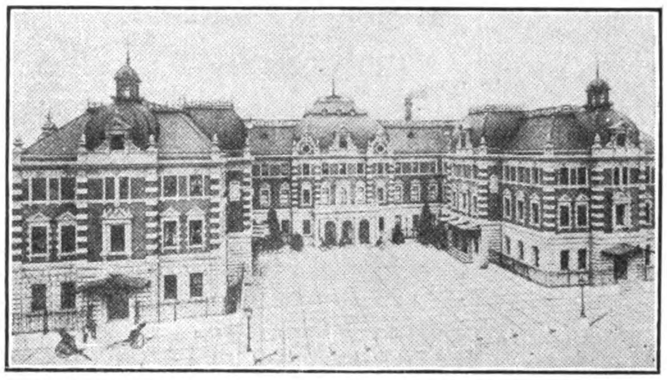
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Semba (Osaka), Kobe, Sannomiya (Kobe), Kyoto, Nagoya, Otaru, Shanghai, New York and London.

General Banking and Exchange Business

Agents for the Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed... ....Y. 100,000,000.00
Capital Paid-Up......................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)
TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

NIHONBASHI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.
New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.
Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.
Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital - - -	Yen 50,000,000.00
Paid-Up Capital - - - -	Yen 36,350,000.00
Reserve Fund - - - -	Yen 33,500,000.00

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:
No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.
T. AKASHI, *Manager*

CITY BRANCHES:
ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:
YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:
SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York; The National Bank of Commerce in New York; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:
The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE ONE HUNDREDTH BANK, LTD.

(DAI HYAKU GINKO)

HEAD OFFICE, AWOMONO-CHO, TOKYO

TOKYO BRANCHES: No. 1 Torihatagocho, Nihonbashi: No. 10, Ginza Nichome, Kyobashi
YOKOHAMA BRANCH: Nos. 53-55 Honcho Shichome
OSAKA BRANCH: 28 Bingo-machi, Nichome
KYOTO BRANCH: Shijo Higashinotoin
SHINMACHI BRANCH: Shinmachi Dori Sanchome

President: K. IKEDA, Esq.

Managing Director: S. CHOH, Esq.

SUBSCRIBED CAPITAL - - - - -	Yen 25,000,000
CAPITAL PAID-UP - - - - - -	Yen 17,500,000
RESERVE FUND - - - - - -	Yen 8,094,340
DEPOSITS - - - - - - - - -	Yen 110,740,264

Transacts General Banking and Foreign Exchange Business. Conducts Trust Company Business

Hongkong and Shanghai Banking Corporation

Paid-up Capital	... ...	$20,000,000
Reserve Funds: Sterling	... ...	£4,500,000
Silver	... ...	$23,500,000
Reserve Liability of Proprietors	... ...	$20,000,000

Court of Directors:

G. M. DODWELL, Esq., Chairman

Hon. Mr. A. O. LANG, Deputy Chairman

D. G. M. BERNARD, Esq.
G. T. M. EDKINS, Esq.
P. H. HOLYOAK, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
A. M. BOWES SMITH, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY	LONDON
BANGKOK	LYONS
BATAVIA	MALACCA
BOMBAY	MANILA
CALCUTTA	NAGASAKI
CANTON	NEW YORK
CHEFOO	PEKING
COLOMBO	PENANG
DAIREN	RANGOON
FOOCHOW	SAIGON
HAIPHONG	S. FRANCISCO
HAMBURG	SHANGHAI
HANKOW	SINGAPORE
HARBIN	SOURABAYA
ILOILO	SUNGEI PATANI
IPOH	TIENTSIN
JOHORE	TSINGTAO
KOBE	VLADIVOSTOCK
KUALA LUMPUR	YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

Ask Us about Canada

SHOULD you require information about Canada's business, trade, natural resources, &c., we shall be pleased to supply you with information and data. In your business dealings with Canada we can offer you every banking facility through our chain of over 600 Branches.

The Royal Bank of Canada

HEAD OFFICE: MONTREAL.

LONDON, ENG. NEW YORK, U.S.A.
PARIS, FRANCE. BARCELONA, SPAIN.

UBEL
SEMI-ROTARY PUMPS

Standardization of parts is a feature of these pumps, guaranteeing interchangeability when necessary. This combined with the looked-for accuracy and finish of the UBEL product, account for the fact that they enjoy an ever increasing popularity and wide-spread demand

Double and Quadruple Acting Semi-Rotary Pumps for Domestic and Trade purposes of every description. Contractors' Pumps, Ships' Pumps, Rotary Suds Pumps for Machine Tools, Plumbers' Force Pumps, Boiler Test Pumps, etc.

Write for Catalogue Section P. covering whole range of UBEL Semi-Rotary and general hand pumps.

Free on application.

United Brassfounders and Engineers Limited

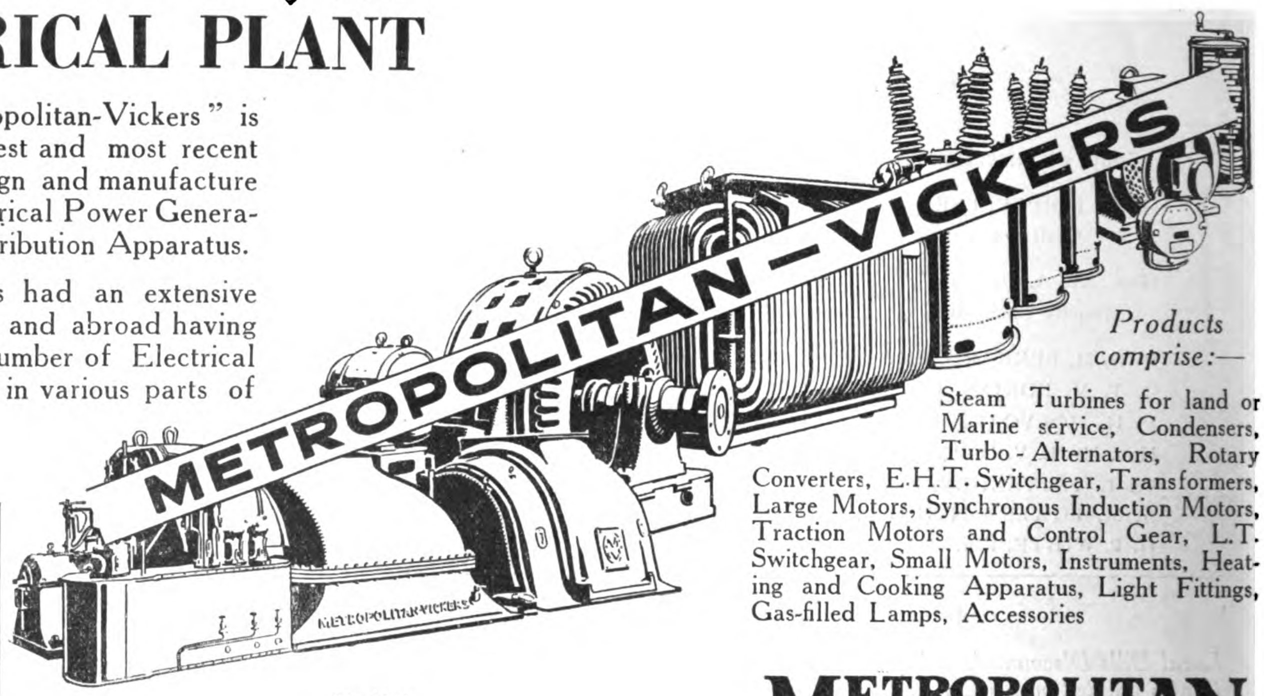
FIVE WORKS UBEL 3000 WORKERS
HEAD OFFICE EMPRESS FOUNDRY CORNBROOK MANCHESTER ENGLAND

Ubel Representative:
ANGLO-CHINESE ENGINEERS ASSOCIATION, LTD.,
83 Chao Yung Ken, Peking

This name
should be on all your
ELECTRICAL PLANT

The name "Metropolitan-Vickers" is indicative of the best and most recent practice in the design and manufacture of all kinds of Electrical Power Generation Plant and Distribution Apparatus.

The Company has had an extensive experience at home and abroad having equipped a large number of Electrical Power Installations in various parts of the world.



Products comprise:—

Steam Turbines for land or Marine service, Condensers, Turbo-Alternators, Rotary Converters, E.H.T. Switchgear, Transformers, Large Motors, Synchronous Induction Motors, Traction Motors and Control Gear, L.T. Switchgear, Small Motors, Instruments, Heating and Cooking Apparatus, Light Fittings, Gas-filled Lamps, Accessories

Agents for China:

Messrs. Arnhold Bros. & Company, Limited,

SHANGHAI

Tientsin Hankow
Peking Changsha
Newchwang Chungking
Mukden Ichang
Harbin Shansi
Hongkong
Canton

The Mark of Efficiency

METROPOLITAN Vickers
ELECTRICAL CO. LTD
TRAFFORD PARK - - - - - - MANCHESTER
ENGLAND 2046C

The "PEAK" Pinion

"THE" NOISELESS GEAR FOR HOT CLIMATES

The "PEAK' PINION is pre-eminent among Noiseless Pinions by reason of the following features:—

1.—It is stronger than any other "noiseless" Pinion made.

2.—It is light in weight (not needing to be reinforced by metal plates).

3.—It is impervious to water, oil, acid and alkali.

4.—It is unaffected by heat.

5.—It can be stored for any length of time without distortion.

6.—It is vermin proof.

"PEAK" Pinions can be used wherever metal gears are employed. By their use the nerve-racking clatter of metal-to-metal gears is done away with. They are smooth-running, and have no "ring." On high-speed electric motors, for positive drives, they are essential, and by their cushioning effect not only save the companion-wheels but prevent vibration and consequent damage to both motor and machine. The Pinions are turned, bored, key-wayed, and teeth accurately machine-cut, and finished complete ready for fitting to shaft.

SOLE MAKERS:

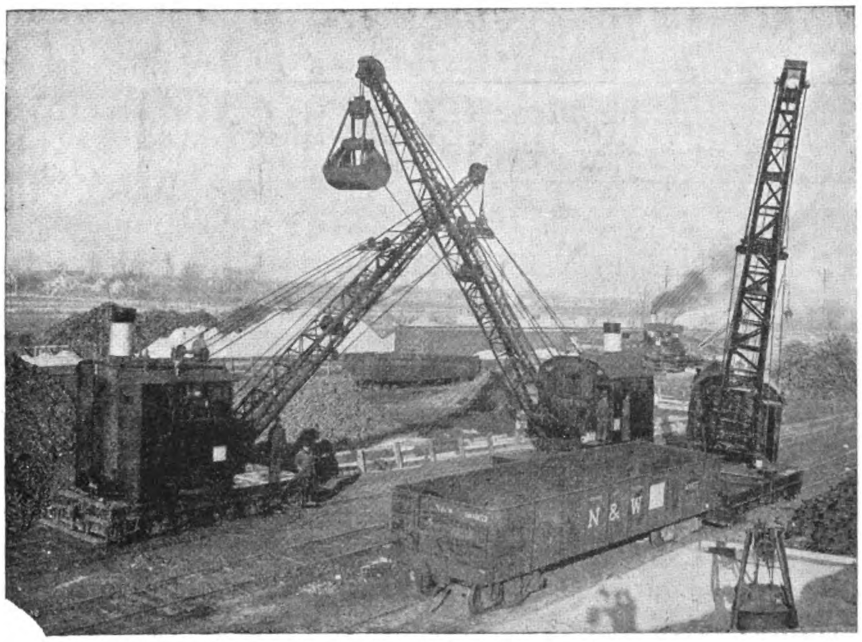
THE REAY GEARWORKS, LTD.

(Manufacturers of all classes of Toothed Gearing),

GATESHEAD-ON-TYNE, ENGLAND

BROWNING

Locomotive Cranes



ALWAYS BUSY

(While more specialized equipment stands idle)

"Nothing but a locomotive crane could be so adaptable. If we did not have the crane, we should require a separate pile-driver, hoist, steam shovel, etc., each involving about the same amount of labor and expense. The good work of our first Browning caused us to buy another Browning."

The above is the practical way in which a prominent contractor writes of the Browning.

We will be glad to send you a catalog describing the special features of Browning Cranes and Buckets. Write us, describing your operations briefly, so that we can tell you what other firms with parallel problems have accomplished with Brownings.

Export Department

The Browning Company

Cleveland, Ohio, U. S. A.

Cable address "Browning"

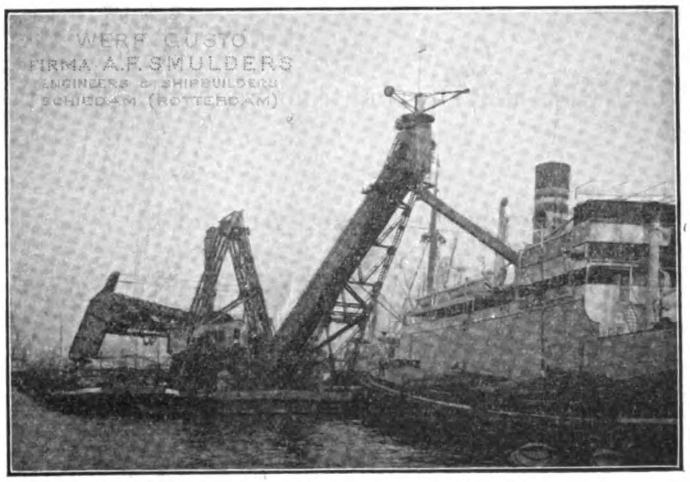
WERF GUSTO (FIRMA A. F. SMULDERS)

SHIPBUILDERS & ENGINEERS

SCHIEDAM, HOLLAND

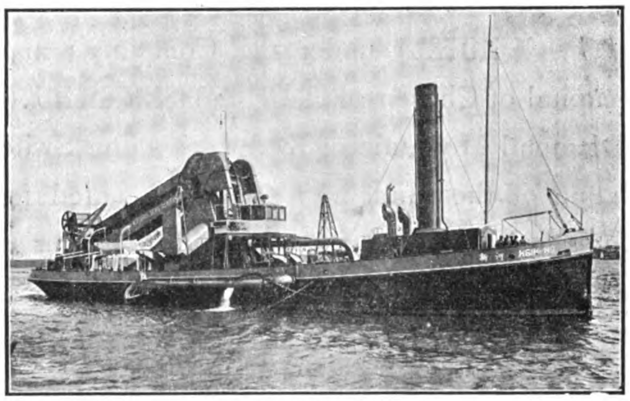
SOLE AGENT FOR UNITED KINGDOM **ANDERSON RODGER**

Tel. Vict 3887 38 VICTORIA STREET, LONDON, SW 1.



COALING ELEVATOR

Coaling Elevator 'Westfalen' with a guaranteed contractual output of 600 tons per hour, which ran up to 1,000 tons at the trial.



DREDGER "SIN-HO"

Sea-going twin-screw bucket and trailing suction dredger with force pump.

FLOATING CRANES of great power from 50 to 400 tons and more (of late years we supplied 24 of these cranes from 60 to 400 tons.)

DREDGING PLANT of all types up to the largest capacities.

COALING VESSELS AND COALING ELEVATORS for bunkering steamers mechanically at rates from 150 to 1,000 tons per hour and upwards.

PASSENGER AND CARGO VESSELS, TANK STEAMERS, TUGS, Etc.

BOILERS of all kinds, land and marine.

BRIDGE, ROOF & CONSTRUCTIONAL STEEL WORK of every description by our Boiler and Girder Works.

SMULDERS, Grace Berleur, n/c Liege, Belgium.

SOUTH MANCHURIA RAILWAY

MANCHURIA AND CHOSEN LINES

Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul and Dairen and Changchun), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least twice a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

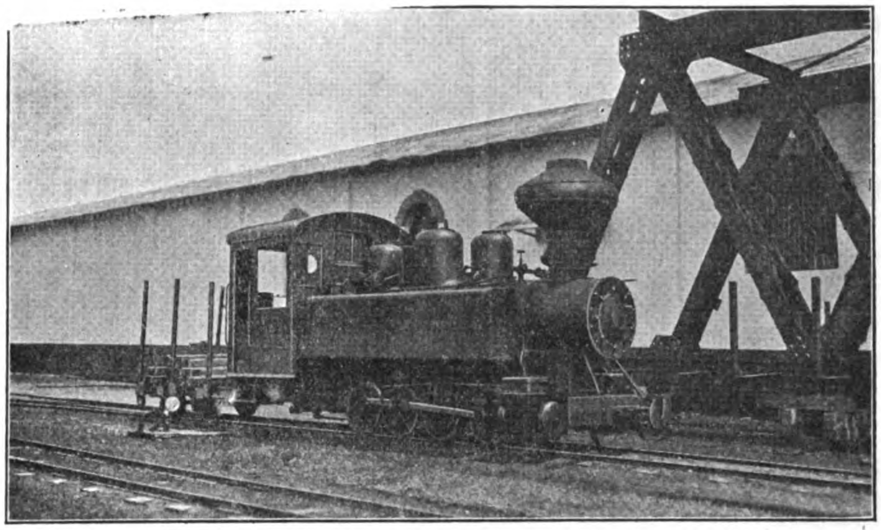
SOUTH MANCHURIA RAILWAY COMPANY

Head Office: DAIREN

Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

Telegraphic Address: MANTETSU or SMRCO. Codes: A.B.C. 5th & 6th Editions, A1 Lieber's, and Bentley's

BALDWIN



BUILT FOR THE SOEMBERDADIE SUGAR FACTORY, JAVA

Gauge 2'3.56". Cylinders, 9-1/2" x 12". Working pressure, 170-lbs. Fuel, wood and coal. Drivers, diameter, 23-1/2". Weight, engine, 30,000-lbs. Service, Plantation.

Baldwin Industrial Locomotives Are Noted The World Over For Their Construction

FROM far away Java, where the locomotive illustrated has been operated for a number of years, reports have been received similar to many from other parts of the world praising the superior construction of Baldwin locomotives, the quality of material used in their manufacture; the simplicity of their construction; the accessibility of all parts to make repairs; the ease and economy in operation and their power under various conditions.

All of these reports help to prove that Baldwin locomotives are known as Standard everywhere. Before ordering motive power, consult our nearest representative.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U.S.A. Cable Address : "Baldwin, Philadelphia"

SALE & FRAZAR, LTD., Tokyo and New York
J. M. WRIGHT, Java, D. E. I.
C. BREWER & CO., LTD., Honolulu, Hawaii
NEWELL & CO., Melbourne, Victoria
ANDERSEN, MEYER & CO., LTD., Shanghai and New York
PHILLIPS & PIKE, Wellington, New Zealand
R. TOWNS & CO., Sydney, New South Wales
LESLIE & CO., Perth, Western Australia
PACIFIC COMMERCIAL CO., Manila, P. I., and New York
J. W. KELKER, Harbin, Manchuria

859

LOCOMOTIVES

JAPANESE GOVERNMENT RAILWAYS

THOROUGHLY EQUIPPED LINES REACH EVERY PLEASURE RESORT AND BUSINESS POINT

Reserved Cars, Private Cars, Special Trains on Previous Arrangement for Tourists' Parties of all Sizes

WELL-FURNISHED PASSENGER CARS WITH SLEEPING AND DINING ACCOMMODATION ON THROUGH TRAINS AND EXPRESSES

TWO MOST RELIABLE ORGANIZATIONS FOR TRAVELLERS

1. JAPAN TOURIST BUREAU
   Peking Office: Morrison Road, Peking
   Head Office: Tokyo Station, Tokyo, Japan
2. JAPAN HOTEL ASSOCIATION
   c/o Traffic Bureau, Japanese Government Railways

For Particulars, Time-Tables, Guide Books, etc., please apply to
TRAFFIC BUREAU, DEPARTMENT OF RAILWAYS, TOKYO, JAPAN

THROUGH BOOKING TO AND FROM

CHINA

Single and Return Tickets between China and Japan via Chosen
Period of Validity: Single, 40 days: Return, 110 days. 20% Reduction for Return Tickets

China-Japan Party Trip Tickets
Period of Validity: Two months. Reduction: 25%-50% for 10 or more passengers

China-Japan Circular Tour Tickets
Period of Validity: Four months. Reduction: 30% for Railway; 25% for Steamer

China-Japan Parcel Through Traffic
Parcel through conveyance between the principal stations in China and Japan viâ Chosen at low rates

OFFICIAL GUIDE-BOOKS TO EASTERN ASIA— ISSUED BY THE JAPANESE GOVERNMENT RAILWAYS, TOKYO, JAPAN.

			In the Far East
Vol.	I.	Chosen, Manchuria, Siberia ... (Revised Edition)	10 Yen
,,	II.	South-Western Japan	5 Yen
,,	III.	North-Eastern Japan...	5 ,,
,,	IV.	China (Revised Edition)	10 ,,
,,	V.	East Indies	7 ,,

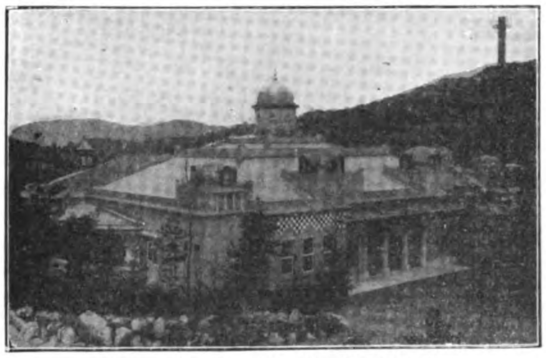
On sale at the best bookstores and principal tourist agencies in the United States, Canada, Great Britain, the principal Continental countries, and throughout the Far East.

"THE HOT SPRINGS OF JAPAN"

(AND THE PRINCIPAL COLD SPRINGS)

INCLUDING

CHOSEN (Korea); SOUTH MANCHURIA; TAIWAN (Formosa)



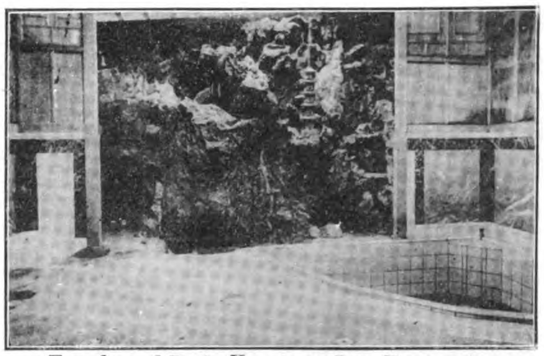
Arima. Radium Spring Bath-house

OFFICIAL SERIES

Issued by the

JAPANESE GOVERNMENT RAILWAYS,

Tokyo, Japan



Fan-shaped Bath, Kansiu-ro Inn, Tonosawa, in Hakone

A standard and comprehensive book that is a mine of information on hot springs, including analyses, lists of diseases *benefited* by the different classes of springs (diseases *prohibited* are also given), the routes to the springs, available hotel accommodations, places of interest at and near the resorts.

Owakidani or Ojigoku ("Big Hell") in Hakone

The book explains the action of the water on the human body, and contains other valuable and interesting information, including data, etc., of mineral springs in the principal countries of the world, and of radium springs.

Much of the information is applicable to mineral springs anywhere

504 PAGES; 196 ILLUSTRATIONS; 2 COLORED LITHOGRAPHS; 15 MAPS, SPECIALLY DRAWN

The book slips into the pocket easily. Price: 7 *Yen* in the Far East

The bookstores of the United States and Canada are supplied through Messrs. O. P. Putnam's Sons, 5 West 45th Street, New York. Those of Great Britain and the Continent through Messrs. G. P. Putnam's Sons, 24 Bedford Street, Strand, London, W.C. 2.

ON SALE IN THE FAR EAST

At all offices of Japan Tourist Bureau: Tokyo, Yokohama, Kobe, Nagasaki, and at Seoul, Tsingtau, Dairen, Harbin, Peking, etc.

At Kelly & Walsh: Yokohama, Shanghai, Hankow, Hongkong, Singapore.

Open Air Hot Spring Bath at Hsiung-yao-cheng, South Manchuria

At the Philippine Educational Co., Manila.

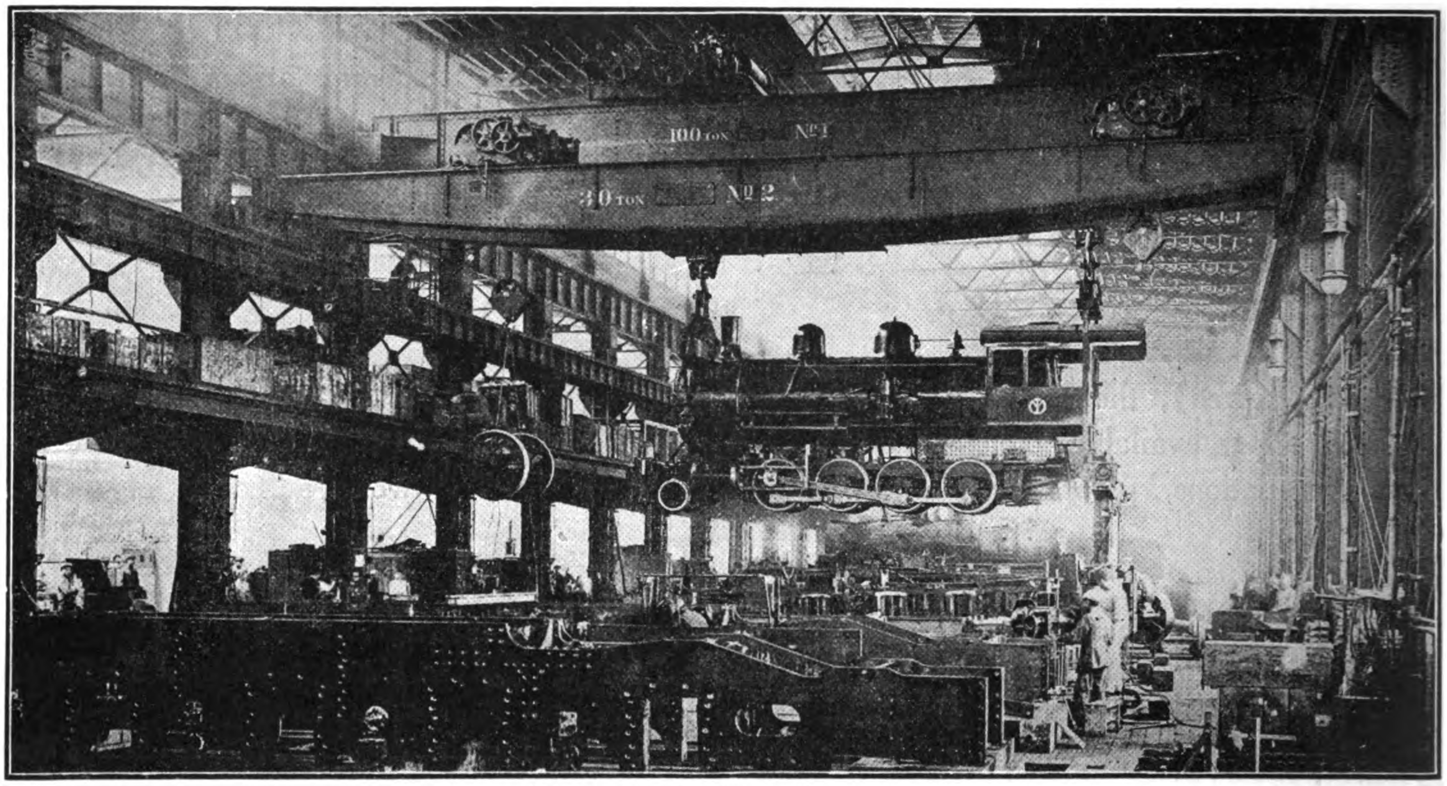
At the leading bookstores in Tokyo and elsewhere in Japan and in China.

At the principal Thos. Cook & Son's offices throughout the World.

SOUTH MANCHURIA RAILWAY

RAILWAY

SHAKAKO WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

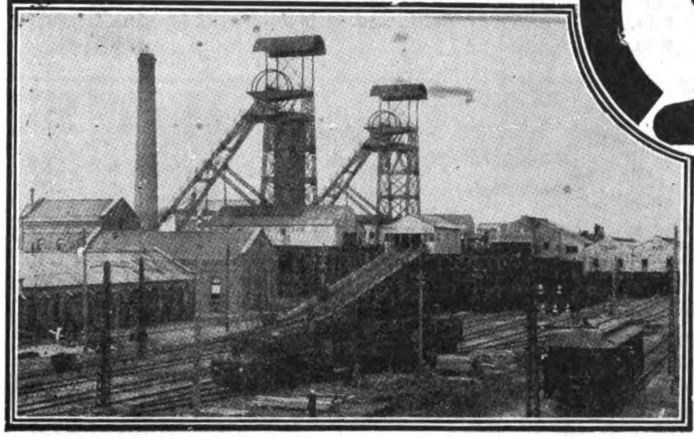
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

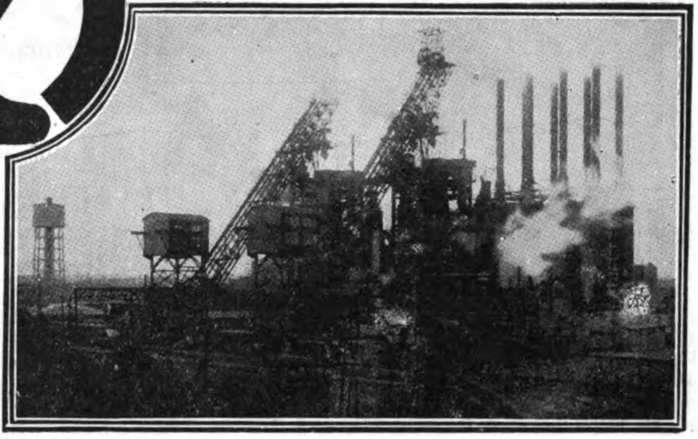
THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON



Togo Pit of the S.M.R. Fushun Collieries



Anshan Steel Works of the S.M.R.

FUSHUN COAL

The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

Depots:

Dairen	Port Arthur	Newchwang
(Yingkou)	Tientsin	Tsingtao

Agencies:

Chefoo	Takao (Formosa)	Osaka
Manila		Nagoya
Hongkong	Batavia	Shanghai
Sourabaya	Yokohama	Moji
Singapore	South Seas	Saigon
Penang	Niigata	etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day) Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day) Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

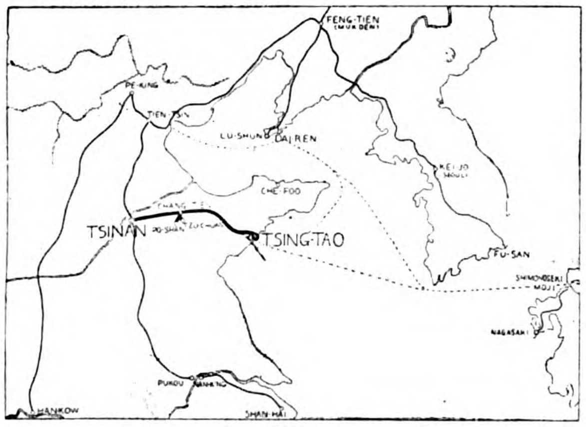
A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

BUT THE TWAIN HAS MET AND BLENDED HERE

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.

For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.

Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway.

At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.

The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1 leaves Tsingtao daily 10.00 p.m. arrives Tsinan 8.00 a.m.
Train No. 3 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.40 p.m.
Train No. 2 leaves Tsinan daily 11.00 p.m. arrives Tsingtao 8.35 a.m.
Train No. 4 leaves Tsinan daily 10.10 a.m. arrives Tsingtao 8.20 p.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30; 2nd class, $7.20.

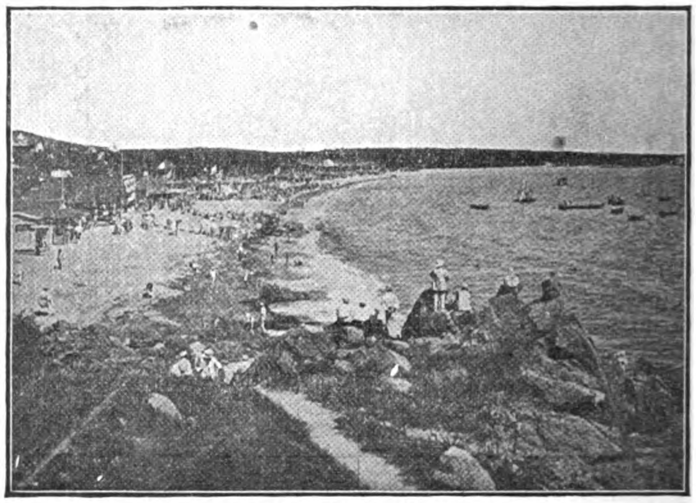
First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.



BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.

TSINGTAU STATION

For Further Information, please apply to

THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

SUPERHEATERS ELESCO

STEAM SUPERHEATERS for Locomotive, Industrial and Marine Service
Feed Water Heater Equipment for Locomotives
Boiler Feed Pumps Pipe Coils
Designing Engineers and Manufacturers

THE SUPERHEATER COMPANY

General Offices: 17 East 42nd St., New York, U.S.A.

PITTSBURGH STEEL CO.

Pittsburgh, Pennsylvania, U.S.A.
Manufacturers of "PITTSBURGH PERFECT"

OPEN HEARTH STEEL PRODUCTS

INCLUDING

Galvanized Wire	Bolt and Rivet Wire
Bright Hard Wire	Galvanized Barbed Wire
Bright Nail Wire	Wire Nails
Annealed Wire	Fence Staples
Bright Soft Wire	

Pig-Iron, Blooms, Billets, Wire Rods, Hard Spring Coil Wire, Twisted Cable Wire, Bale Ties, Steel Hoops, Steel Bands, Cotton Ties and Fabricated Stock, Poultry and Lawn Fencing.

We are prepared to give PROMPT SERVICE, and solicit your inquiries accompanied by complete specifications.

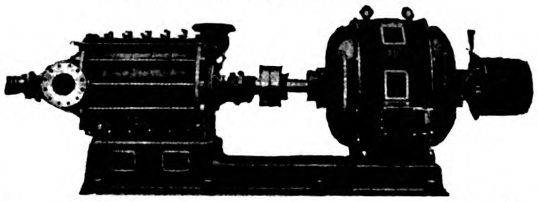
ADDRESS:

PITTSBURGH STEEL CO.

EXPORT DEPARTMENT:
EQUITABLE BUILDING, NEW YORK, U. S. A.
Cable Address: "PITTSTEEL."

"BON ACCORD" TURBINE PUMPS

For Mine Sinking, and Pnmping

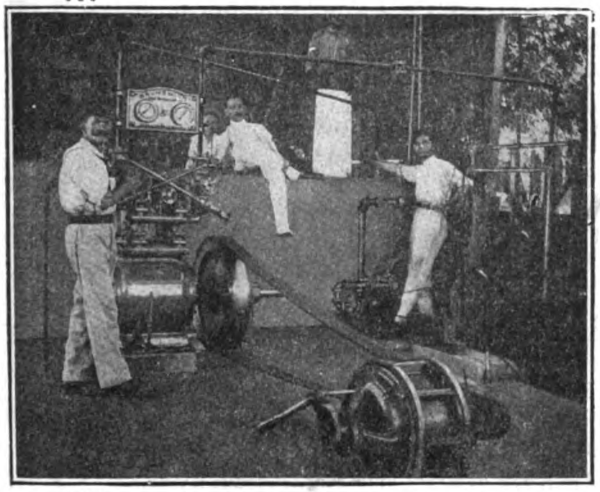


6-Stage "Ring" Type Turbine Pump, Driven by A.C. Motor for Mine Purpose, 600 Galls. per min., 200 feet head.

DRYSDALE & Co., Ltd., Yoker, Glasgow

Tel. Address: Bonaccord, Glasgow

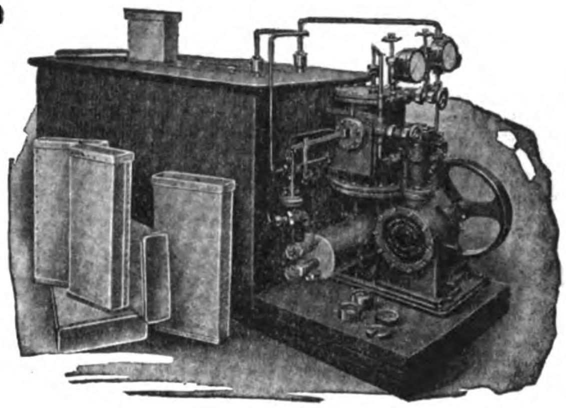
Brunswick Refrigeration



We show here a *Brunswick* installation in the ice-making plant of Juan B. del Giudice of San Pedro de Macoris, D. R. The cut illustrates clearly both the simplicity and efficiency of the *Brunswick* equipment, its rugged construction and its ease of operation. This machine was installed in 1914, has been in constant operation ever since and has given such satisfaction that a second similar machine has lately been installed. Attention is directed to the perfection of the cake of ice just drawn from the can.

Brunswick refrigerating and ice-making machinery is adaptable to numerous industries,—markets, dairies, meat and produce-preserving plants, bottling establishments, cold storage, etc. These dependable machines can give refrigeration and produce ice at one and the same time. Blue prints and detailed instructions for installation and operation furnished with each plant.

BRUNSWICK



We particularly call attention to our standard portable ice-making plant, shown opposite This little equipment produces 250-lb. of ice daily. It is shipped complete and ready to make ice as soon as charged with ammonia and connected to power and water supply. We also manufacture ice-making machines varying in capacities up to six tons daily.

Brunswick-Kroeschell Company

Dept. 2, New Brunswick, N.J., U.S.A.

G-E EDISON LAMPS

Are Dependable

All reliable dealers sell them

International General Electric Company, Inc.

NEW YORK
120 Broadway

SCHENECTADY
New York

Address all correspondence to nearest representative

Japan: International General Electric Company, Inc., Yokohama; Shibaura Engineering Works, Tokyo; Tokyo Electric Company Ltd., Kawasaki.
Philippines: Pacific Commercial Company, Manila.
Dutch East Indies: N. V. de Twentsche Handel Mij., v/h de Rooij en Co., Soerabaia, Java.
China: Andersen, Meyer & Company, Ltd., Shanghai.

General office for the Far East, excluding Japan and China: International General Electric Company, Inc., Shanghai.

AWARDED GRAND PRIZE OF HONOUR
PANAMA PACIFIC EXHIBITION, SAN FRANCISCO, 1915.
MOST POPULAR **BEER** IN THE ORIENT

ASAHI **YEBISU** **SAPPORO**
BREWED BY
THE DAI NIPPON BREWERY CO., LTD.
HEAD OFFICE: TOKYO
BRANCHES OSAKA, SAPPORO, SEOUL, SHANGHAI, TSINGTAO.
SOLD EVERYWHERE
Agents: MITSUI BUSSAN KAISHA,
China, Straits Settlements, Dutch East Indies, and British India

PUBLISHED ANNUALLY
THE LONDON DIRECTORY
with Provincial & Foreign Sections,
enables traders to communicate direct with
MANUFACTURERS & DEALERS
in London and in the Provincial Towns and Industrial Centres of the United Kingdom and the Continent of Europe. The names, addresses and other details are classified under more than 2,000 trade headings, including
EXPORT MERCHANTS
with detailed particulars of the Goods shipped and the Colonial and Foreign Markets supplied ;
STEAMSHIP LINES
arranged under the Ports to which they sail, and indicating the approximate Sailings.

One-inch BUSINESS CARDS of Firms desiring to extend their connections or Trade Cards of
DEALERS SEEKING AGENCIES
can be printed at a cost of 30 shillings for each trade heading under which they are inserted. Larger advertisements from £2 to £16.

A copy of the directory will be sent by parcel post for 40 shillings nett cash with order.

THE LONDON DIRECTORY CO., LTD.
25 Abchurch Lane, London, E.C. 4, England

BUSINESS ESTABLISHED 108 YEARS

THE

North-China Daily News

Established in 1850 as a weekly; in 1870 as a daily

To the Reader

The "North-China Daily News" writes the history of China. It records the pulse of its politics; it reports the conditions of its finance and its markets; and it chronicles the daily doings of its people.

To the Advertiser

The greatest purchasing power in China is that possessed by readers of the "North-China Daily News." It is the newspaper which is found in every office, consular or commercial; it is the newspaper most frequently quoted both by the foreign and vernacular press; and it is the one newspaper which combines a quality with a quantity circulation—being the largest both in size and circulation in China. It was the first newspaper to publish audited circulation statements.

Subscription: Mex. $28 per annum.

(Postage Extra).

The North-China Herald

Is the weekly edition of the "North-China Daily News" for readers abroad. It contains 95 per cent. of news and is the best medium for keeping in touch with events in China when out of reach of the daily.

Subscription: Mex. $16 per annum.

(Postage Extra).

Copies of either of the above publications will be sent to anyone interested on request.

NORTH-CHINA DAILY NEWS & HERALD, LTD.,
Shanghai.

Telegraphic Address: "Herald Shanghai."—All Codes.

A NORTH-CHINA

TRADE DIRECTORY

The North China Desk Hong List

Is the only Trade Directory of North China issued twice a year. Its information is the most accurate and complete. Published regularly since 1865 it has grown to 900 pages. In addition to the names and addresses of every foreign firm, resident, and missionary in China it contains the following classified information:—

SHANGHAI HONG LIST.—All firms, institutions, missions, consulates, etc., in Shanghai, with staffs, arranged alphabetically.

TRADE DIRECTORY.—A list of all Shanghai firms under their professional or trade headings.

AGENCIES.—Agencies held by Shanghai firms are listed alphabetically, with the firm's name after them.

STREET DIRECTORY.—A list of the streets of Shanghai in English and Chinese, with the occupants of all foreign and many Chinese houses, offices, and stores.

SHANGHAI WHO'S WHO.—An alphabetical list of the men of Shanghai, with their business addresses.

RAILWAYS.—A list of the Northern Railways of China, with their foreign and native staffs, including those resident in Shanghai.

RESIDENTIAL DIRECTORY.—A complete list of the foreign residents of Shanghai, arranged alphabetically, with their private addresses.

OUTPORT HONG LIST.—A list of Northern and Central China cities and outports with foreign firms and institutions and their staffs.

OUTPORT WHO'S WHO.—An alphabetical list of foreign men in Northern and Central China, compiled from the Outport and Railway Sections of this work.

OUTPORT LADIES' LIST.—An alphabetical list of foreign ladies, not engaged in mission work, resident in Northern and Central China.

OUTPORT MISSIONARIES.—Classified alphabetically by provinces. Under the names of the provinces are given the towns where missions are established, with list of residents. This is divided into two sections: (1) Protestants, (2) Roman Catholics. Mission Institutions, such as Schools, Colleges, etc., will be found under the respective Ports in which they are instituted.

MISSIONS WHO'S WHO.—An alphabetical list of missionaries of each denomination, compiled from the previous section.

GENERAL.—Consular, postal, exchange and other information.

PRICES:

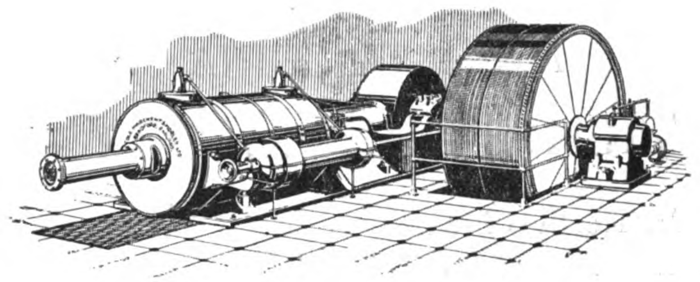
Shanghai $8 with map $6 without map

On Sale at the Offices of

The North-China Daily News

(Temporary offices during rebuilding)

2B Kiukiang Road, Shanghai



C. M. & M.
CENTRAL EXHAUST STEAM ENGINE

100 to 3,000 I.H.P.

The ideal Prime Mover for driving Mills and Plant where moderate power from 100 to 3,000 I.H.P. is required

PRINCIPAL FEATURES

ECONOMY: The steam consumption equals that of a good Triple Expansion Engine.

SIMPLICITY: This type of engine is undoubtedly the simplest economical engine of the present day.

UPKEEP COSTS: Owing to the low steam consumption, simplicity and to the fact that forced lubrication is fitted, upkeep costs and attendance are reduced to the minimum.

FLOOR SPACE OCCUPIED: Is considerably less than that required by Horizontal Compound Engines.

The above illustration is of a 1,500 I.H.P. C. M. & M. Central Exhaust Steam Engine recently shipped to Hankow, China.

Write to-day for Catalogues Nos. 63 & 69, which will be sent post free on request.

ESTA. 1848

REG. TRADE MARK

Cole, Marchent & Morley, Ltd.

Bradford, England

Cables: "Cole Bradford"

No Valves to Adjust when you Use Model N Metropolitan Injectors

The Model N Metropolitan Injector is an automatic injector of exceptionally wide working range and unfailing performance. It is extremely simple to operate—a half turn of the single handle starts or stops it. No water or steam valves to adjust or repair, no trouble, and no worry about restarting if the water supply is temporarily interrupted—as it restarts automatically.

It operates over a pressure range from 20 to 160 pounds without adjustment and will lift water 20 ft.

Fitted with British or Metric standard connections.

Our agents are prepared to advise with you and quote prices. Consult them also, regarding Ashcroft Gauges and Consolidated Safety Valves, used for years by engineers the world over.

Manning, Maxwell & Moore, Inc.

119 W. 40th St.

New York

Agent for China:

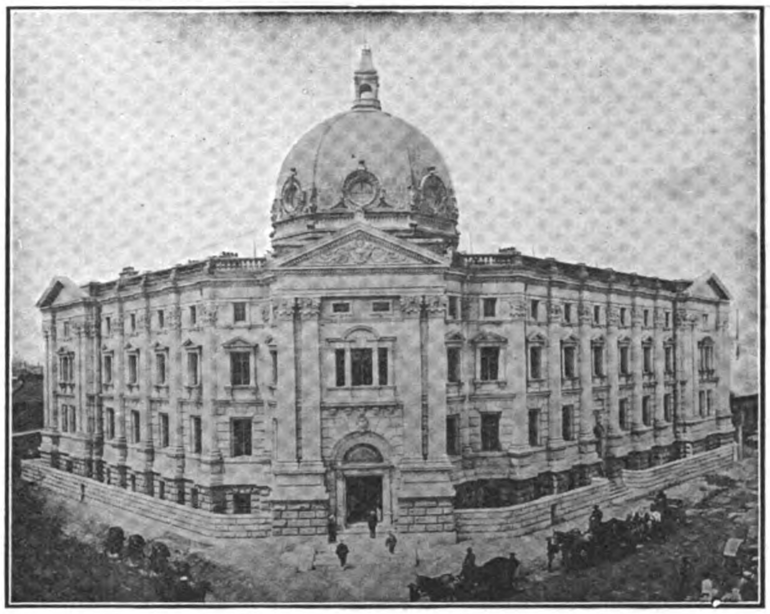
Henry Katten, 22 Kiukiang Road, Shanghai, China

Agent for Japan: Horne Co., Ltd., 6 Takiyama cho, Kyobashi Ku, Tokio

METROPOLITAN INJECTORS

Capital (Fully Paid-Up): Yen 100,000,000

Reserve Fund: Yen 65,000,000



HEAD OFFICE, YOKOHAMA

CORRESPONDENTS AT ALL THE CHIEF COMMERCIAL CITIES IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: KENJI KODAMA, Esq.
Vice-President: REITARO ICHINOMIYA, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASUNOSUKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
NAKAJI KAJIWARA, Esq.
SHIMAKICHI SUZUKI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
BARON KAISAKU MORIMURA
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.
HIROZO MORI, Esq.
KUNIZO MOGAMI, Esq.

Head Office: YOKOHAMA
Manager: N. IGARASHI, Esq.

TOKYO BRANCH
No. 1, Nichome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES:

Batavia	Dairen	Hongkong	Los Angeles	Nagoya	Rangoon	Shanghai	Tientsin
Bombay	Fengtien	Honolulu	*(sub-office of San Francisco Branch)*	Newchwang	Rio de Janeiro	Shimonoseki	Tsinan
Buenos Aires	Hamburg	Kaiyuang	Lyons	New York	Saigon	Singapore	Tsingtau
Calcutta	Hankow	Kobe	Manila	Osaka	San Francisco	Sourabaya	Vladivostock
Changchun	Harbin	London	Nagasaki	Peking	Seattle	Sydney	

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

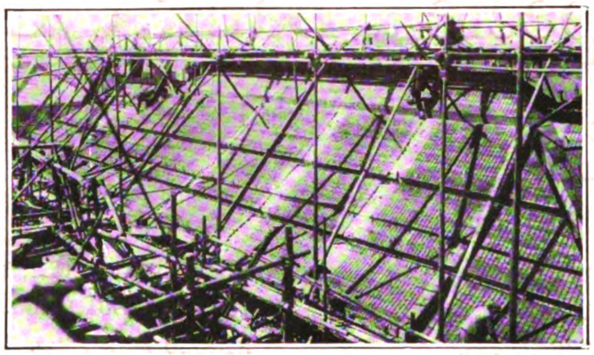
Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.

Special Distributors for Triangle Mesh in China:

ANDERSEN, MEYER & Co., Ltd., Shanghai

SHEWAN, TOMES & Co., Hongkong

TRIANGLE MESH



Triangle Mesh used in Roof Construction of the Union Medical College, Peking

FOR GENERAL REINFORCED CONCRETE

UNITED STATES STEEL PRODUCTS CO.

SHANGHAI OFFICE: Union Building, The Bund and Canton Road

PEKING OFFICE: No. 22 Wu Liang Ta Jen Hutung

TOKYO OFFICE: No. 15 Nakadori, Marunouchi

CABLE ADDRESS:

"STEELYARD SHANGHAI"

大正七年七月十日第三種郵便物認可

PP 9990.af

THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

上海仁記路第五號

遠東時報

FACING THE FACTS

ELECTRICAL DEVELOPMENT IN JAPAN

YANGTZE RIVER BRIDGE

LAND OF THE ROKO

INDO-CHINA

OIL FIELDS OF THE N. E. I.

POWDERED COAL

Vol. XVIII December, 1922 No. 12

A. L. TAYLER

SHANGHAI, PEKING, TOKYO AND MANILA

Some Outstanding Features of the Walworth Complete Line for Oil Fields and Refineries

ALL WALWORTH QUALITY

FIG. W4104

FIG. W2621
IRON BODY GATE VALVE

Standard Malleable Fittings and Nipples, Extra Heavy Cast Iron Fittings, Hydraulic Steel Fittings, "Kewanee", National and Oil Country Flange Unions, Power Plant Material of all Kinds.

"Genuine Walworth Stillson" and Reversible Bostong Pipe Wrenches, Standard Globe, Angle and Check Brass Gate Valves, Standard and Extra Heavy Iron Body Gate Valves with Non-Rising Stem. Extra Heavy Iron Cocks.

FIG. W1323
HYDRAULIC FITTING

FIG. W3782
IRON COCK

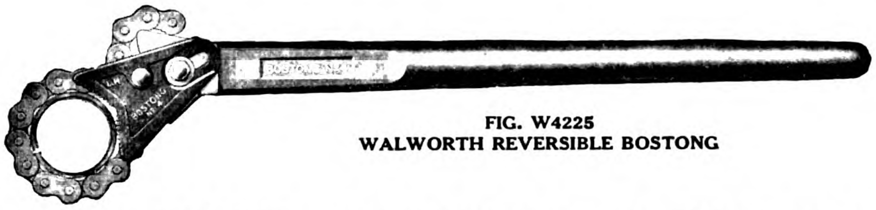


FIG. W4225
WALWORTH REVERSIBLE BOSTONG

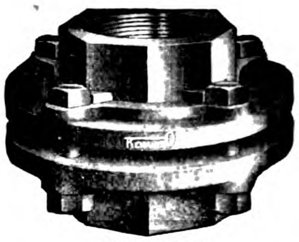


FIG. W2351
"KEWANEE" FLANGE UNION

WALWORTH MANUFACTURING COMPANY

Oldest continuous manufacturers in the United States (since 1842) of a complete line of Valves, Fittings and Tools for steam, water, oil, gas, and air. Originators of the Famous "GENUINE WALWORTH STILLSON" Wrench and the "KEWANEE" Union.

Export Sales Agents: WALWORTH INTERNATIONAL COMPANY, New York City, U. S. A.

Foreign Sales Offices in All Principal Cities

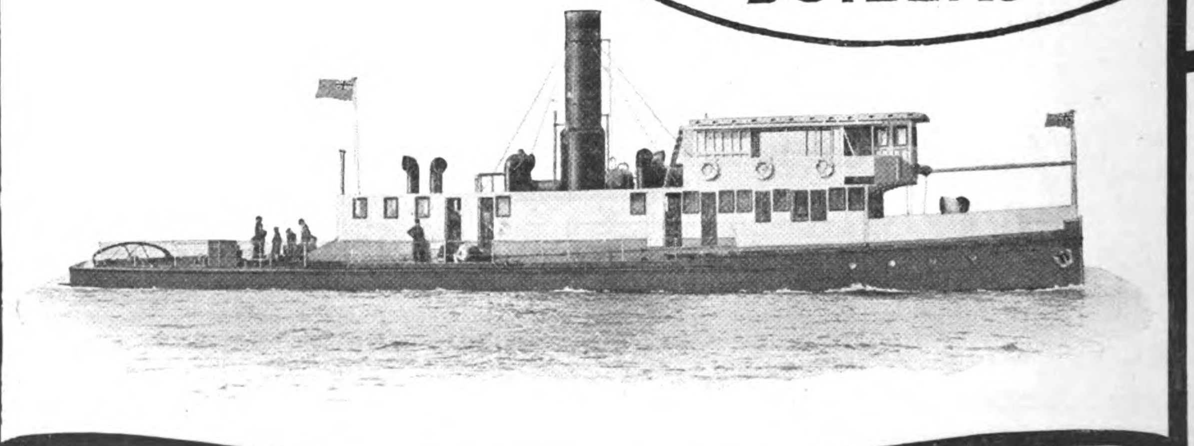
For catalog, prices or information address

HENRY KATTEN 22 Kiuking Road Shanghai, China

YARROW

& CO (1922) LTD
GLASGOW

for
PASSENGER & CARGO
STEAMERS
SHALLOW DRAFT VESSELS
LAND & MARINE
BOILERS



FOUNDED, 1904

The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.

HEAD OFFICE: 5 JINKEE ROAD - - - - SHANGHAI, CHINA.

George Bronson Rea, *Editor and Publisher* — William Carter Rea, *Advertising Manager*

JAPAN OFFICE: H. C. Huggins, Representative, No. 12 Takagi-cho, Akasaka-ku, Tokyo.

NEW YORK: British and Colonial Press, Inc., 738 The Knickerbocker Building, Broadway and 42nd Street.

MANILA OFFICE: Fleming, Percy Smith and Seth, Roxas Building, Escolta.

BERLIN: Rudolf Mosse, 46-49 Jerusalemer Strasse.

GREAT BRITAIN: Walter Judd, Ltd., 81-87 Gresham Street Bank, London, E.C.

SAN FRANCISCO: Leroy P. Boyce, Monadnock Building

SUBSCRIPTION IN CHINA: $10.00 Mexican, U. S. & Philippines Gold $5.00, Elsewhere $12.00 Mexican per annum

VOL. XVIII DECEMBER, 1922 NO. 12

CONTENTS:

	PAGE
FACING THE FACTS	721
I.—MANCHURIA—THE POWDER MAGAZINE	723
II.—MANCHURIA—THE OTHER SIDE OF THE QUESTION	727
III.—MANCHURIA—STUNG	728
IV.—MANCHURIA—EQUAL OPPORTUNITY IN MANCHURIA	729
V.—MANCHURIA—POLITICS AND PEDESTALS	731
THE CRIME AGAINST AMERICA	733
BRITISH ENGINEERING TRADE IN CHINA AND JAPAN	735
THE FATUOUS POLICY OF THE CHIAOTUNGPU	737
VAST WATERWORKS EXTENSIONS IN THE FAR EAST	738
LOOKING AHEAD A QUARTER OF A CENTURY	739
WILL WOOD COME BACK?	740
IN MEMORIUM—GENERAL LUKE E. WRIGHT	*741
THE NEW KAILAN BUILDING AT TIENTSIN	*742
PRIVATE RAILWAYS IN JAPAN	743
TIENPOSHAN-TUMEN LIGHT RAILWAY	*744
AMERICAN ENTERPRISE IN CHINA	*746
REPORT UPON A PROJECT FOR BRIDGING THE YANGTZE RIVER BETWEEN THE CITIES OF NANKING AND PUKOW	*748
THE LARGEST DIESEL ENGINED VESSEL	*750
A HYDRAULIC PILE FOR USE ON THE YELLOW RIVER BRIDGE	*751
MOTOR COACHES ON THE KOWLOON-CANTON RAILWAY	*752
JAPANESE HOUSE BUYS $50,000,000 YEARLY IN U.S.	*754
ELECTRICALLY-PROPELLED CARGO SHIP "BIYO MARU"	*757
OIL FIELDS OF THE DUTCH INDIES	*761
TEAK MILLING IN SIAM	*763
IN THE LAND OF THE ROKO	*764
ELECTRICAL DEVELOPMENT IN JAPAN	*768
GROWTH OF LARGE BANKS IN JAPAN	*776
INDO-CHINA	*778
LIBRARY BUILDING FOR NATIONAL SOUTH-EASTERN UNIVERSITY, NANKING	*784
POWDERED COAL: ITS APPLICATION AND ADVANTAGES	*785

**Illustrated with Maps or Photographs*

Entered at the U.S. Postal Agency, Shanghai, China, as second-class matter. Registered at the Chinese Post Office as a Newspaper. Entered at the Japanese Post Office as a Newspaper.

ALPHABETICAL LIST OF ADVERTISERS

Admiral Line, The 41
Allen & Co., Ltd., Edgar 14
American Locomotive Sales Corp..... 25
American Tool Works Co. 1
Andersen, Meyer & Co., Ltd. 28
Asbestos Shingle, Slate & Sheathing Co. 17
Ashton Frost & Co., Ltd............ 19
Atlantic, Gulf & Pacific Co of Manila 36
Attwater & Sons 48
Avery, Ltd., W. & T................ 15

Babcock & Wilcox, Ltd. 31
Baldwin Locomotive Works.......... 67
Bank of Chosen 54
Bank of Communications............ 59
Banque de l'Indo-Chine 56
Bank of Taiwan, Ltd. 57
Bliss Co., E. W. 27
Brill Co., J. G...................... 39
British-American Tobacco Company (China), Ltd. 52
Browning Co., The 65
Brunswick Kroeschell & Co......... 49
Bucyrus Company 9
Butterfield & Swire 44

Canada Carbide Co. 15
Chartered Bank of India, Australia & China 48
Chicago, Milwaukee & St. Paul Railway 39
Clough, S. W. 4
Craig & Donald, Ltd. 31

Dai-Ichi Ginko 62
Dai Nippon Brewery Co. 74
Diamond Power Specialty Corporation 42
Dixon Crucible Co., Joseph 76
Dorman Long & Co., Ltd. 3

Drewry Car Co., Ltd. 19
Drysdale & Co., Ltd................ 73

Electricity Department, S. M. C. 4
English Electric Co., Ltd. 13
Evans & Sons (Wolverhampton), Ld., Joseph 2

First National Bank of Boston...... 57
Fuji Gassed Spinning Co. 10

Gleniffer Motors, Ltd. 15
Goodell-Pratt Co. 65
Green Island Cement Co., Ltd., The.. 20
Greenfield Tap & Die Corp.......... 19
Greening & Sons, Ltd., N. 4

Heap & Co., Ltd., Joshua 53
Hongkong Rope Manufacturing Co. . 20
Hongkong & Shanghai Banking Corporation........................ 63
Hongkong & Whampoa Dock Co., Ld. 30
Hotel Statler Co. 51
Humber, Ltd...................... 11

Imperial Japanese Government Railways 68, 69
Industrial Bank of Japan 58
International Banking Corporation.. 55
International General Electric Co., Inc. 74

Japan Sugar Mfg. Co. 6
Jardine, Matheson & Co., Ltd. 12
Jones & Lamson Machine Co......... 53
Jugo Ginko 56

Kanegafuchi Spinning Co., Ltd. 10
Kawasaki Dockyard Co., Ltd....... 35

Kellogg Switchboard & Supply Co... 64
Kelvin, Bottomley & Baird, Ltd.,.... 8
Kokusai Kisen Kaisha 45

London Directory Co., Ltd.......... 74
Low & Sons, Ltd., Archibald........ 42

Manning, Maxwell & Moore, Inc..... 76
Mather and Platt, Ltd.............. 7
Matthews & Yates, Ltd. 42
Metropolitan Vickers Electrical Co., Ltd. 64
McClintic-Marshall Products Co. 27
McConway and Torley Co. 21
Mitsubishi Bank 61
Mitsubishi Iron & Steel Co., Ltd..... 38
Mitsubishi Marine & Fire Ins. Co., Ld. 38
Mitsubishi Shoji Kaisha 18
Mitsubishi Warehouse Co. 38
Mitsubishi Zosen Kaisha, Ltd........ 26
Mitsui Bank 61
Mitsui Mining Co.................. 18
Mitsui Bussan Kaisha 26
Morse & Son, Inc., A. J. 74
Motor Rail & Tram Car Co.......... 41
Mustard & Co...................... 4

New Engineering & Shipbuilding Works........................ 34
Nippon Menkwa Kabushiki Kaisha.. 50
Nippon Yusen Kaisha 46, 47
Nobel Industries, Ltd. 22

Okura & Co. (Trading), Ltd......... 24
One Hundredth Bank, Ltd., The.... 62
Oster Manufacturing Co. 63

Pittsburgh Steel Co. 73
Pooley & Son, Ltd., Henry 2

Republic Truck Sales Corp. 11
Royal Bank of Canada 57
Ruston & Hornsby, Ltd............. 21
Ryerson & Son, Joseph T. 5

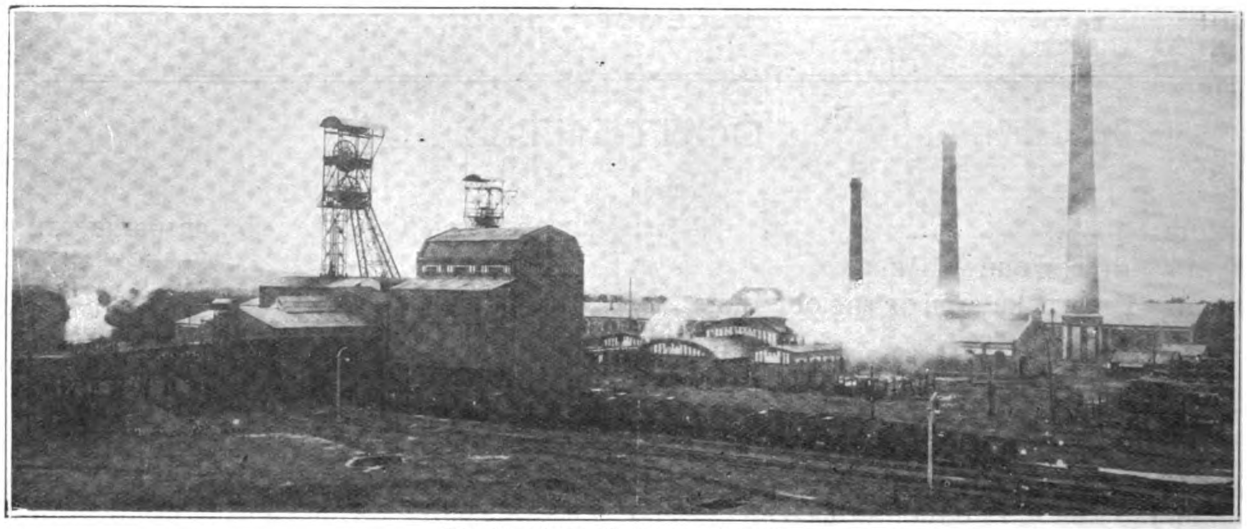
Sale & Frazar, Ltd. 16
Scottish Tube Co., Ltd.............. 8
Selson Engineering Co., Ltd......... 43
Shanghai Dock & Eng. Co., Ltd...... 32
Shanghai Municipal Council 4
Shantung Railways 72
Simons & Co., Ltd., Wm. 14
Smith, Major & Stevens, Ltd. 33
South Manchuria Railway Co. 66, 70, 71
Standard Oil Co. of N. Y. 29
Sulzer Bros. 39
Sumitomo......................... 60
Sumitomo Bank, Ltd. 60
Superheater Co., The 73

Thornycroft & Co., John I........... 1
Toshin Soko 40
Toyo Kisen Kaisha 43
Trimont Manufacturing Co. 9

United Cigarette & Machine Co. 41
United States Steel Products Company........... ...23, 37, Back Cover

Walworth International Co. ......Cover
Wharton Jr. & Co. Inc., Wm. 21
Whittall & Co., Ltd., J. 6
Wild & Co., M. B. 9
Williams & Co., J. H. 7

Yarrow & Co., Ltd................Cover
Yokohama Dock Co. Ltd. 33
Yokohama Specie Bank, Ltd.......Cover



The Tzuchuan Colliery, Shantung

TZUCHUAN COAL

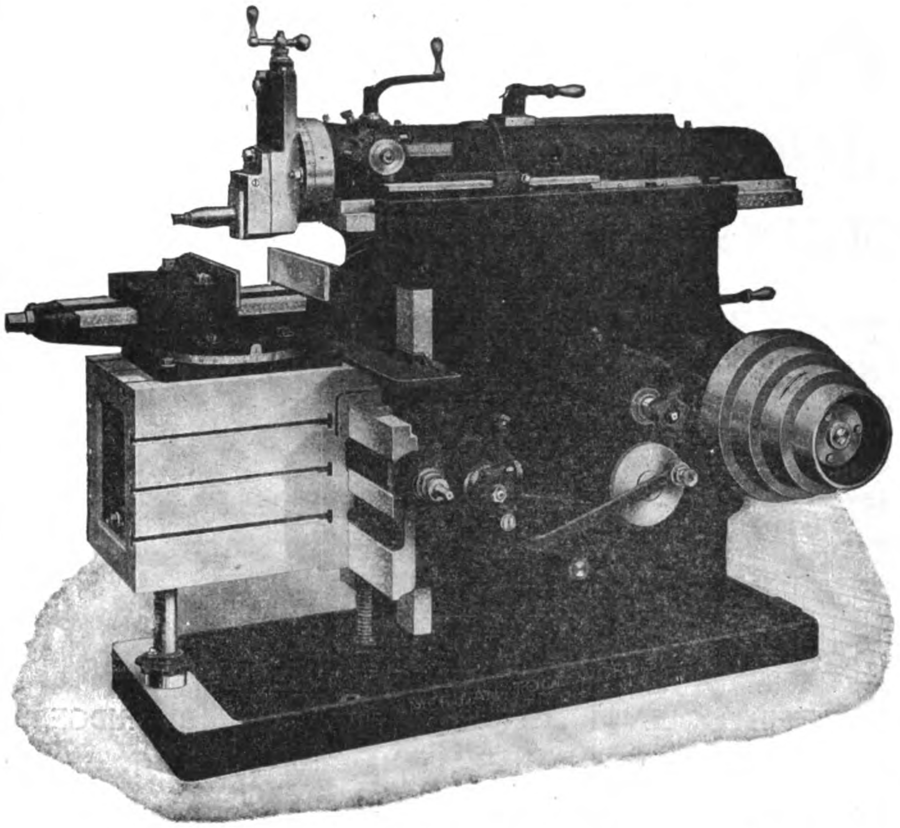
The Cheapest and Best Coal Mined in the Far East

Annual Output: 600,000 tons.
The Coal is washed, screened, and classified for the market into five grades, viz., Lump, Slack, and Washed Coal Nos. 1, 2 and 3.
Tzuchuan Coal contains a large amount of coke, with only a small amount of ash, and has a heating capacity of 7,500 calories.
Tzuchuan Coal, which rivals the best Cardiff Coal, is highly recommended for Coke and Briquette manufacture, for Boiler and Marine use and for General Domestic use
Tokuyama Briquette Factory, Yawata Iron and Steel Works, and many other important works in Japan and China are constant purchasers.
The Wharves at Tsingtao are well accommodated as Coaling Stations for Coast and Ocean liners.

For further information please apply to the

SHANTUNG RAILWAY ADMINISTRATION

Cable Address: "SANTETSU"   TSINGTAO, CHINA   Codes: A.B.C. 5th Ed. & A.1.



AMERICAN

If you want a Shaper you can depend upon for convenience and economic production, don't fail to find out all about this new

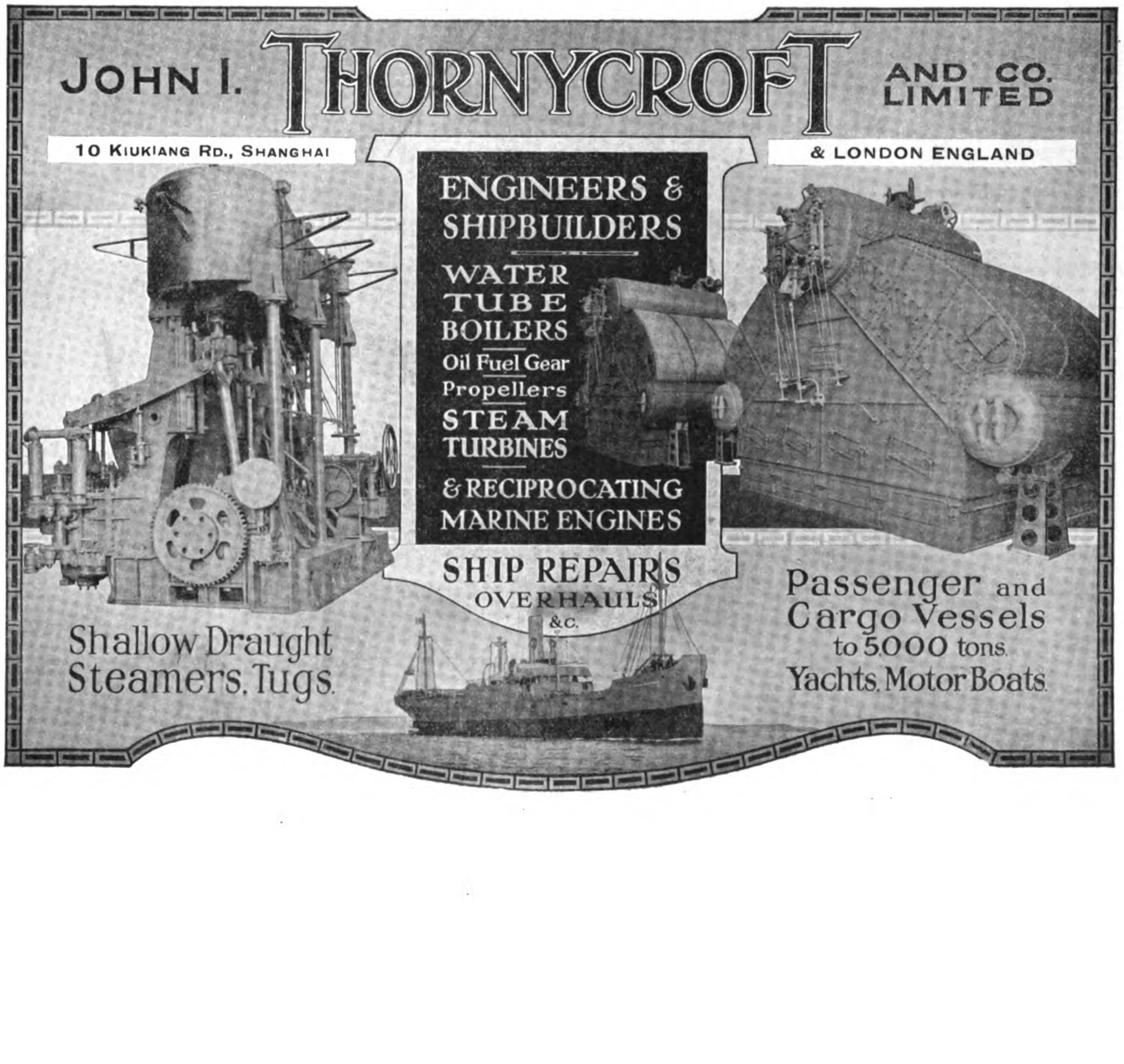
"AMERICAN"

Because of its tremendous power it is admirably adapted to heavy manufacturing, while its accuracy and ease of handling has made it a favorite in the tool room. Don't let this opportunity pass; *write us immediately.*

Agents: Andersen, Meyer & Co., Ltd., Shanghai and Manchuria
Horne Co., Ltd., Tokio, Japan
H. P. Gregory & Co., Sydney & Melbourne
Pacific Commercial Co., Manila, P.I.
Honolulu Iron Works, Honolulu, H.I.

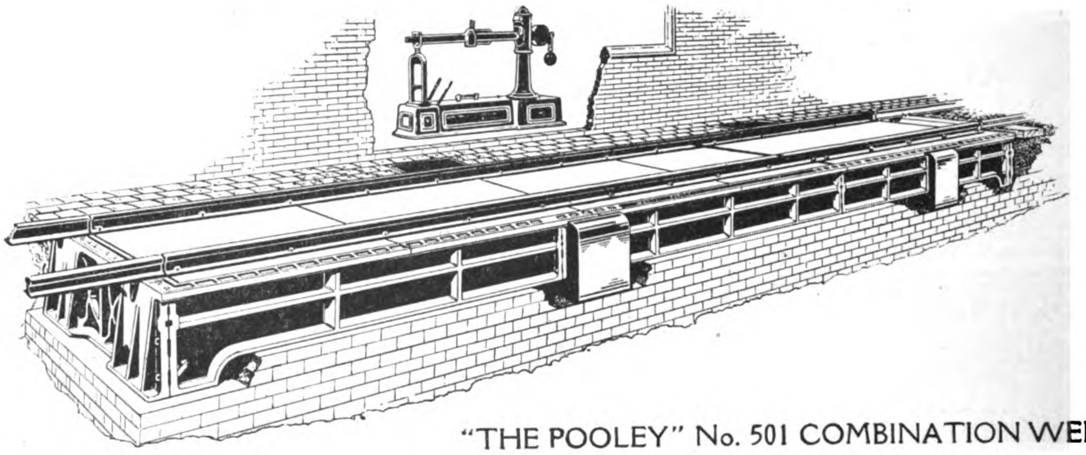
THE AMERICAN TOOL WORKS COMPANY

Lathes-Planers CINCINNATI, U.S.A. Shapers-Radials



POOLEY

WEIGHING MACHINE & WEIGHBRIDGE MAKERS



"THE POOLEY" No. 501 COMBINATION WEIGHBRIDGE, CAPACITY 70 TONS, SPECIALLY DESIGNED FOR CHINA.

HENRY POOLEY & SON LTD
JOHN BRIGHT ST
BIRMINGHAM
ENGLAND

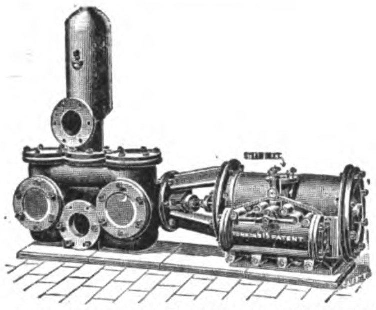
P.A. 123.

WE MANUFACTURE

PUMPS

FOR EVERY PURPOSE

To be worked by HAND, STEAM, BELT, WIND, WATER or ELECTRIC POWER.



STEAM PUMP for General Purposes

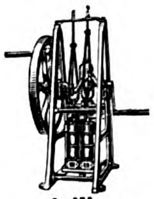
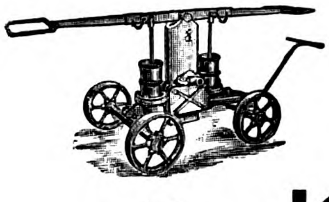
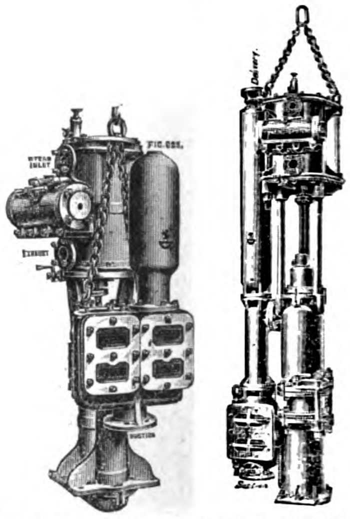


Fig. 228.

Fig. 160.

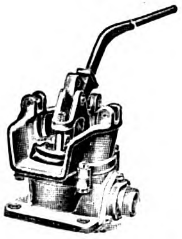




SINKING PUMPS for COLLIERIES, MINES, Etc.

Fig. 191.

Fig. 185.



Write for "Eastern" List.

JOSEPH EVANS & SONS

(WOLVERHAMPTON) LTD

CULWELL WORKS,

WOLVERHAMPTON, ENGLAND.

Agents for China

J. WHITTALL & CO., LTD.

16 Victoria Terrace Tientsin | 12 Nanking Road Shanghai | 33 Ta Juan Fu Hutung Peking

Stocks Kept in Tientsin and Shanghai.

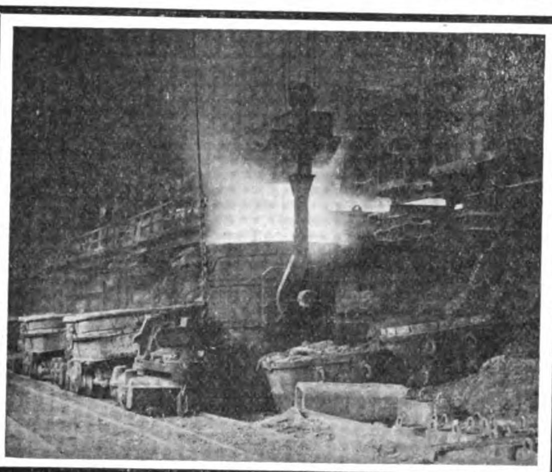
DORMAN, LONG & Co., Ltd.

Steel Manufacturers,
Bridge Builders & Constructional Engineers,

MIDDLESBROUGH, ENGLAND.

Telegraphic Address:
"DORMAN-MIDDLESBROUGH."

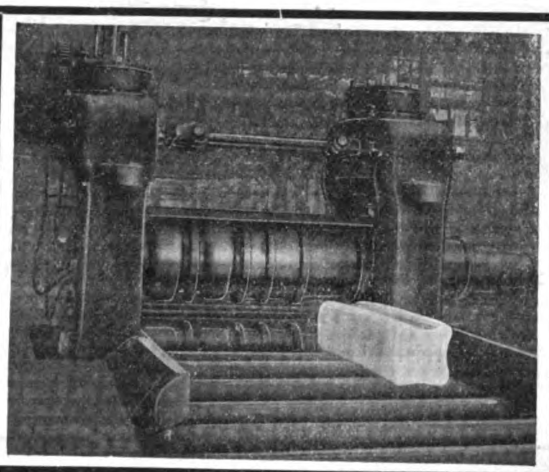
Codes —
BENTLEY'S; A.B.C. (5th and 6th Editions) and WESTERN UNION (Universal & 5 Letter).



Britannia Steelworks,
MIDDLESBROUGH.

Open-Hearth STEEL JOISTS, ANGLES and OTHER SECTIONS, RAILS.

Open-Hearth STEEL BARS in long lengths suitable for **FERRO-CONCRETE WORK, BILLETS AND BLOOMS.**



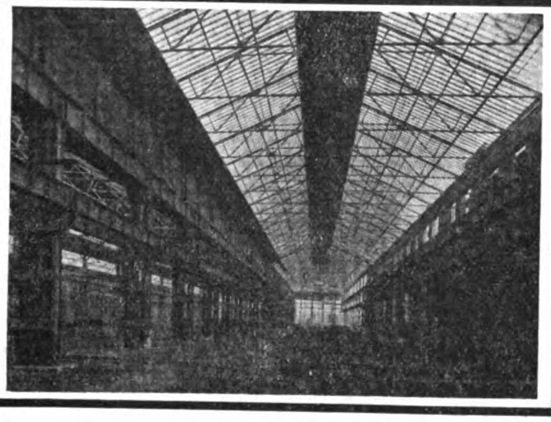
Redcar Iron and Steel Works, Redcar.

Steel Works and Rolling Mill Dept.
Plate Mills capable of Rolling all Plates for **Shipbuilding and Engineering** purposes, from $\frac{3}{16}''$ to $1\frac{1}{2}''$ thick, fulfilling the requirements of British Standard Tests, Board of Trade, Admiralty, Lloyds, etc.
Universal Plates with Rolled Edges 12″ to 42″ wide up to 90-ft. long.

Clarence Steel Works and Rolling Mills,
PORT CLARENCE.
High-class Steel in quality from Dead Soft to 1.25 per cent. Carbon for the manufacture of Wire, Springs, Files, Saws, Forgings, Stampings, Rifle Barrels, Agricultural Implements, etc. Conductivity Steel to stand General Post Office, India Office and British Railway Tests.
Electrically Melted Steels of all Carbons.
NICKEL ALLOY STEEL.
Flange and Bulb Head Rails, Billets, Slabs, etc.

Ayrton Rolling Mills,
MIDDLESBROUGH.
Galvanized Corrugated and Plain Sheets,
Ridging, Gutters, Downpipes, Fountain Heads, etc.
Ordinary Galvanized Fittings kept in Stock.

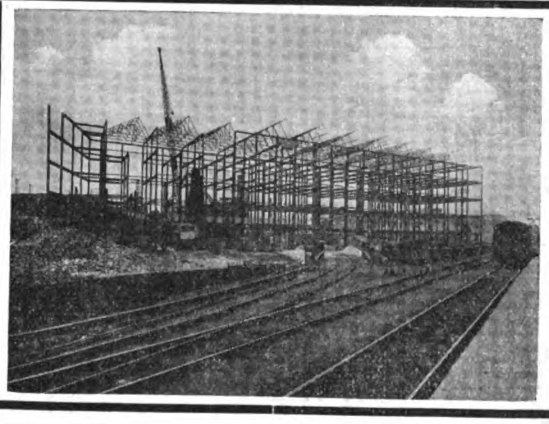
Cleveland Wire Mills,
MIDDLESBROUGH.
Wire Rods and all kinds of Wire for all purposes. Telegraph & Telephone Wire. Annealed Core Wire. Galvanized Seizing Wire. Galvanized Rigging Wire. Galvanized & Varnished Fencing Wire. Galvanized Strand & Barb Wire. Galvanized Cable Wire.
Galvanized Patent Steel Hawser Wire to Lloyd's Tests.
Bright Patent and Plough Steel Rope Wire.
The Mills can supply the **longest single length** of Rods or Wire without weld or joint of anyone in the Trade.



Constructional Department,
MIDDLESBROUGH.

STRUCTURAL STEELWORK
for all purposes.

Speciality:
STEEL FRAME BUILDINGS
for home and abroad.



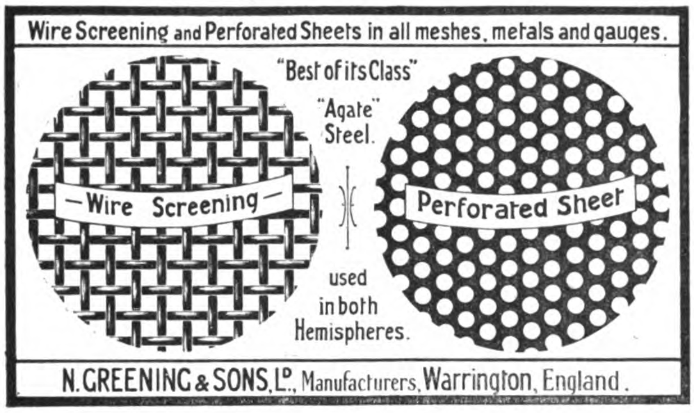
AGENTS:—

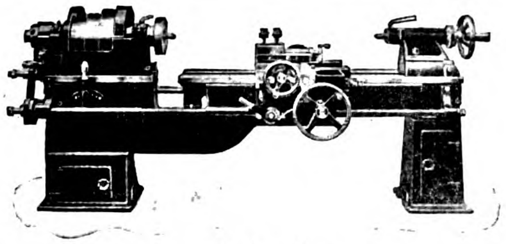
REPRESENTATION for BRITISH MANUFACTURERS, LTD.

CHING MING BUILDINGS, BRITISH CONCESSION, HANKOW.

43 KIANGSE ROAD, SHANGHAI.

REGINES BUILDINGS, LEGATION STREET, PEKING.





HEAVY

DUTY

LATHES

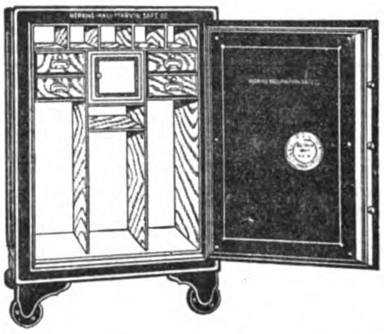
7-in. and 9-in. Centres

HIGH-CLASS MACHINES AT MODERATE PRICES

S. W. CLOUGH

REDBURN LATHE WORKS

SHIPLEY, Eng.



Unfailing Protection For Your Most Valued Possessions

HERRING-HALL-MARVIN

Safes and Bank Vaults

All sizes from the smallest Home Safe to the largest Bank Vaults, Key-Lock or Combination.

MUSTARD & COMPANY

Sole Agents for China, Hongkong and Macao.

Shanghai, Tientsin, Hankow, Hongkong, Canton, Harbin.

THE

MUNICIPAL ELECTRICITY DEPARTMENT

HAS RECEIVED DEMANDS FOR

ELECTRIC POWER

AMOUNTING TO

80,000 HORSE POWER

AND PLANS TO INCREASE ITS GENERATING PLANT TO A CAPACITY OF

180,000 HORSE POWER

? DO **YOU** THINK ?

IT IS POSSIBLE TO MAKE YOUR OWN POWER AT A COST WHICH CAN COMPETE

WITH THE **CHEAP RATES** MADE AVAILABLE

BY THE OPERATION OF THIS VAST MODERN POWER PLANT?

ASK

THE POWER DEPARTMENT, FOOCHOW ROAD, SHANGHAI

TELEPHONE FOR AN APPOINTMENT TO CENTRAL 283.

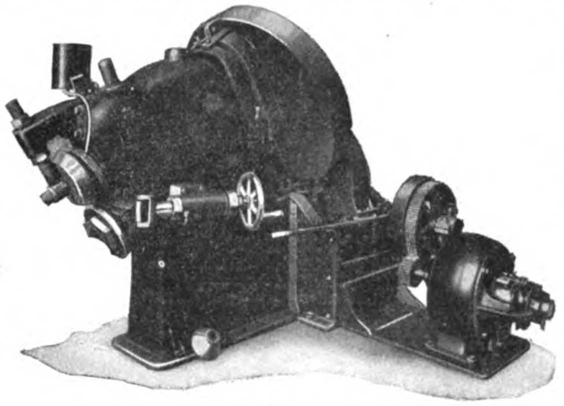
RYERSON

Special Shearing Equipment

U. S. and Foreign Patents

Lennox Rotary Bevel Shear

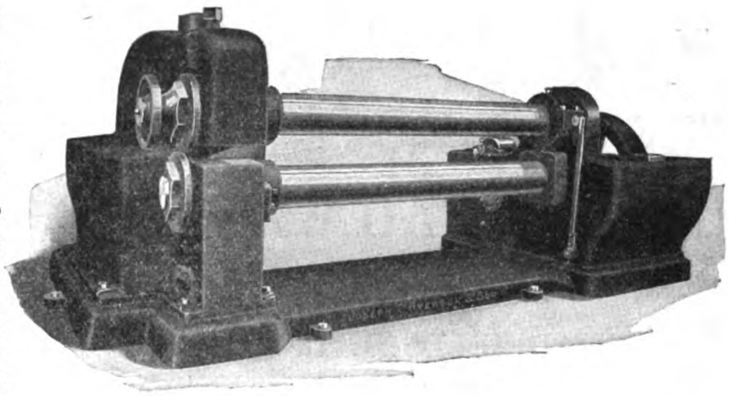
The Lennox Rotary Bevel Shear has long been recognized as a necessary part of the equipment of the modern boiler and tank shop, at the present time there being in use several thousand of these machines, embracing practically all of the principal boiler, tank, railroad, car and shipbuilding plants of the world.



This machine will bevel all of the irregular and curved sheets usually required in boiler and tank construction. It will bevel-shear in-and-out curves of segments, angles, and such difficult work as boiler heads after flanging, manhole saddles, dome sheets; and, in addition, will handle straight work in a small proportion of the time in which it can be done by hand or on a plate planer.

Lennox Rotary Splitting Shear

(Housing Type)



The Lennox Rotary Splitting Shear is designed for straight shearing of sheets and plates, but will also cut round, square or flat bars of a diameter or thickness corresponding to the capacity of the tool for plates. The blades are milled, making the machine self-feeding, and, having two cutting edges, are reversible. The main frame is offset so that plates of any length may be split without distortion. The extended upper shaft carries a hold-down wheel to guide the plate and prevent it from tipping. This, together with the enclosed form cutter shaft, which operates as a rest, materially assists the operator and makes unnecessary the use of a hoist and an extra helper.

Machines are made in regular sizes of 4, 6, 8 and 10 feet between housings, with capacities from ¾″ to 1½″ mild steel plate. Special sizes can be furnished to order. A bulletin on any particular machine, or a complete catalogue on all Ryerson Machines, will be furnished upon request.

JOSEPH T. RYERSON & SON

NEW YORK
BUFFALO

ESTABLISHED 1842
CHICAGO, ILL., U. S. A.

ST. LOUIS
DETROIT

Cable Address: Ryson, Chicago. Telegraphic Codes: Western Union, Lieber's, A. B. C. (5th Edition), Bentley's, Ryerson.

13

TRADE MARK S

CABLE ADDRESS: "SUGAR," TOKYO
CODE: A.B.C. 5TH EDITION
Head Office:
No. 12 Sanchome, Kakigara-Cho,
Nihonbashi-Ku, TOKYO

RAW SUGAR REFINED

THE JAPAN SUGAR CO., LTD.
(DAI NIPPON SEITO KABUSHIKI KAISHA)
CAPITAL: YEN 18,000,000; PAID-UP: YEN 12,000,000

TRADE MARK S

J. WHITTALL & CO., LTD.

TIENTSIN — ENGINEERS AND MERCHANTS SPECIALISTS IN — PEKING

MINING, RAILWAY AND TEXTILE MACHINERY

Agents in North China for:

HADFIELDS, LTD.
Mining and Light Railway Material of all Kinds

BELLIS & MORCOM, LTD.
Engines, Turbines, Condensers and Air Compressors

CROMPTON & COMPANY, LTD.
Electrical Generators and Motors

JOHNSON & PHILLIPS, LTD.
Electrical Cables and Transformers

M. B. WILD & COMPANY, LTD.
Winding and Hauling Machinery

HOWARD & BULLOUGH, LTD.
Textile Machinery and Cotton Mill Accessories

WARRINGTON WIRE ROPE WORKS, LTD.
Steel Wire Ropes

JOSEPH EVANS & SONS, LTD.
Mining Pumps

LEWIS BERGER & SONS, LTD.
Paints

Codes : Engineering 2nd Ed. A.B.C., 5th Ed. Bentley's: Kendall's: Scholfields: Private

Telegrams: "Whittal."

WILLIAMS' "AGRIPPA"

TOOL HOLDERS

The consistent effort of nearly half a century to produce only the best, that has made the name "Williams" a synonyn for superior quality, is the guarantee back of "Agrippa" Tool Holders. Designed for heavy cuts at high speeds, they are rugged, sturdy tools with many unique features that make for convenience and economy. All are drop-forged from special steel, heat-treated and hardened.
In stock for all machining operations.

J. H. WILLIAMS & CO.

"The Drop-Forging People"

Export Office :
124 State Street,
New York, U.S.A.

London Representative :
Benjamin Whittaker, Ltd.,
Dept. K.
56 Ludgate Hill, E.C. 4

General Office :
124 Richards Street,
Brooklyn, N.Y., U.S.A.

Finishing Machinery

THE illustration is one of our Calenders of the heaviest and most powerful type for the production of the well-known "Silk Finish" on cotton goods by embossing a series of very fine lines on their faces. These Calenders can be driven by electric motor, by double cylinder diagonal steam engine, or by pully and clutch.

Mather & Platt, Ltd.

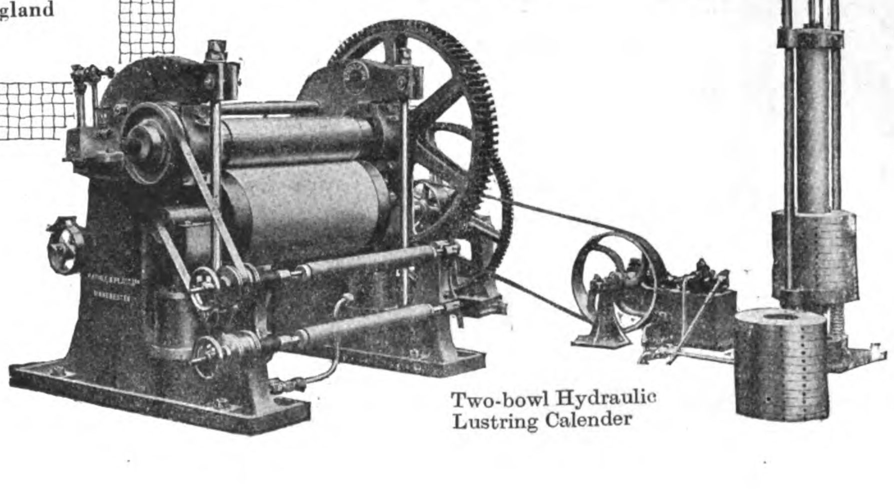
Park Works,
Manchester.

14 Great Smith Street,
London, S.W., England

47 Szechuen Road, Shanghai

Some Specialities:

Gas Singeing Machines. Mather Kiers.
Open Width Bleaching Machinery.
Mercerising Ranges.
Duplex and Intermittent Printing Machines.
Open Soaping Ranges.
High-Speed Beetling Machines.
High-Speed Stentering Machines.
Spray Damping Machines.
Calenders for all Purposes.
Dyeing Machines for Cops, Cheese, Raw Cotton, etc.



Two-bowl Hydraulic
Lustring Calender

TUBES

IRON, STEEL, BLACK, GALVANISED

BOILER TUBES

Gas Water and Steam Tubes and Fittings

Boring & Casing Tubes

Tubular Coils for Heating and other Purposes.

STC

Sole Licensees in Great Britain for the Manufacture of

"ARMCO" Rust and Corrosion Resisting Iron Tubes

Write for Descriptive Pamphlet

THE SCOTTISH TUBE CO., LTD.

Head Office: 34 Robertson Street, GLASGOW.

Branch Offices—London, Manchester, Leeds, Liverpool, Newcastle-on-Tyne, Cardiff, Sydney, N.S.W.; Wellington, N.Z., Johannesburg, Cape Town and Durban, S.A.

Works—Glasgow, Govan, Coatbridge, Rutherglen and Garnkirk.

Telegraphic Address: "Scotubeco" Glasgow. Codes: A1, A.B.C. (4th & 5th Editions), Lieber's, Bentley's, Western Union and Private.

The Pneumercator Tank-Gauge

(PATENTED)

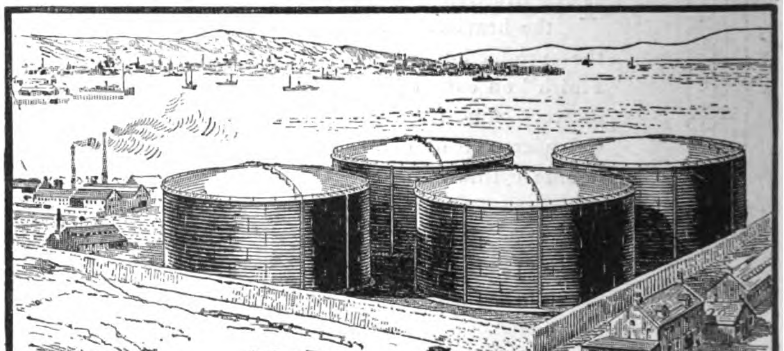
Measures and Weighs

FUEL OIL

or Any Liquid,
in Any Tank,
at Any Distance

Unaffected by
Changes of
Temperature.

NO FIRE RISKS.



WRITE FOR DESCRIPTIVE BOOKLET.

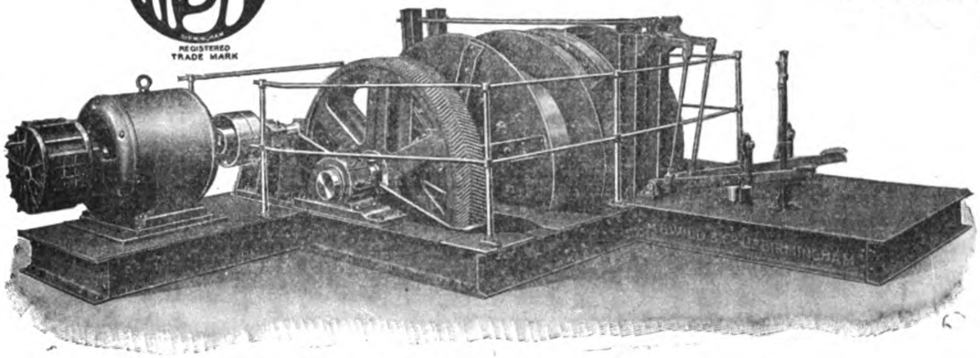
Sole Manufacturers for GREAT BRITAIN and EUROPE, INDIA, CHINA, AUSTRALIA, NEW ZEALAND, SOUTH AFRICA, ARGENTINE REPUBLIC, CHILE

KELVIN BOTTOMLEY & BAIRD L^TD

KBB MANUFACTURERS OF THE LATE LORD KELVIN'S INVENTIONS AND OTHER INSTRUMENTS KBB

18 CAMBRIDGE ST. GLASGOW

YOUR HAULAGE REQUIREMENTS



Will be best met by a firm with a long experience with this class of Machinery. This, in combination with fully equipped and specially adapted works, enables us to offer machines most suited to your needs.

Write for our illustrated Catalogue and Lists.

M. B. WILD & CO., LTD., BIRMINGHAM., ENGLAND

Telegrams: "Hauling," Birmingham. *Codes:* A B C (5th Ed.) Lieber's, Bentley's.

AGENTS:

J. WHITTALL & CO., LTD.

SHANGHAI TIENTSIN PEKING

TEL. ADD.: "WHITTALL" TIENTSIN
14, 16 & 18 VICTORIA TERRACE,
TIENTSIN

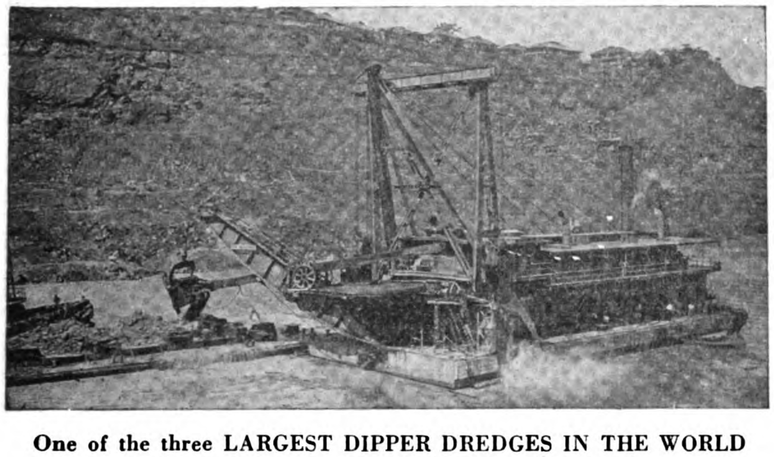
TEL. ADD.: "WHITSHANG" SHANGHAI
KELLY & WALSH BLDG.,
SHANGHAI

TEL. ADD.: "WHITTALL" PEKING
32 TA JUAN FU HUTUNG,
PEKING

"BUCYRUS"

TRADE-MARK Registered

EXCAVATING MACHINERY



One of the three LARGEST DIPPER DREDGES IN THE WORLD

All Three Were Designed and Built by Bucyrus for the

PANAMA CANAL

All sizes and Types of Dredges, as well as Land Excavating Machinery —40 Years Experience.

BUCYRUS COMPANY

South Milwaukee, Wisconsin, U.S.A.

Cable Address: "BUCYRUS, SOUTH MILWAUKEE"

London Office: BUCYRUS COMPANY, 19, Iddesleigh House, Caxton Street, Westminster.

Agents in Siam: D. Couper-Johnston & Co., Bangkok, Siam.

Agents in India: McLeod & Co., Calcutta and Bombay, India.

Agents in Malay States: The Borneo Company, Ltd., Singapore, S.S.

TRIMO WRENCHES

Pipe Wrench

Supplied with steel frames that do not break, nut guards that keep the adjusting nut from being turned accidently in close quarters, and inserted jaws in end of handle that can be removed when worn, saving the handle.

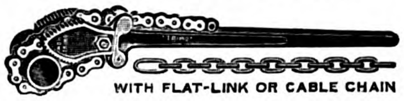
There are other superior points that every user of Trimo Pipe Wrenches knows—all for economy to the user.

Nut Wrench

Trimo Pipe Cutter

As a 1 or 3 Wheel Cutter

Trimo Chain Wrench



WITH FLAT-LINK OR CABLE CHAIN

TRIMONT MFG. CO.,

Roxbury (Boston), Mass.

JAPANESE

TEXTILES

FOR EXPORT

Standard Printed and Dyed Cotton and Silk Fabrics

SHIRTINGS SHEETINGS DRILLS
PRINTS CRETONNES FLANNELETTES
DAMASKS TOWELING CREPES
ETC. ETC.

PONGEES BROCADES SATINS
CREPES SILKS

FUJI GASSED SPINNING COMPANY, LIMITED

(FUJI GASU BOSEKI KABUSHIKI KAISHA)

Head Office:
GOCHOME, OSHIMA-MACHI
NEAR TOKYO
CABLE ADDRESS: "FUHO"

CAPITAL - Yen 38,000,000
OPERATING
450,000 Spindles and
1,775 Looms

Business Office:
SHICHOME, HAKOZAKI-CHO,
NIHONBASHI-KU,
TOKYO

Silks, Crepes, Brocades, Cotton Cloths, Muslins

SILK AND COTTON YARNS, NOILS, etc.

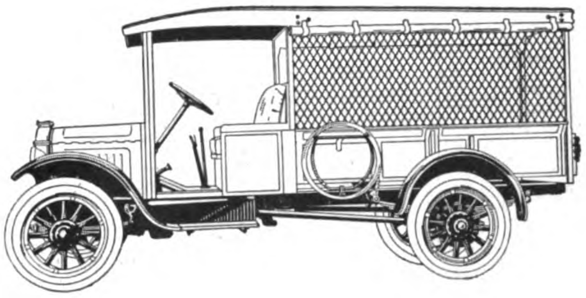
OUR EXPORT DEPARTMENT
IS REPRESENTED IN ALL THE IMPORTANT COMMERCIAL CENTERS OF THE WORLD AND CAN FURNISH PROMPTLY FULL INFORMATION AND QUOTATIONS REGARDING THE LARGE VARIETY OF TEXTILES MADE IN OUR MILLS

KANEGAFUCHI SPINNING COMPANY, LIMITED

HIGASHI-SHIRIIKE, KOBE, JAPAN

UNEQUALLED SERVICE
TO THE USER

REPUBLIC



This light Republic Delivery Van is the latest type of commercial vehicle which fills the demand for quick service and capable of covering a large district.

Built by the largest organization exclusively devoted to the production of commercial vehicles, complete satisfaction is assured from correct design and the finest of materials.

Low first cost plus low operating expense guarantee profitable and reliable service.

There are Republic vehicles for every trade and all purposes.

Central Garage Co., Ltd.,
9 Hongkong Road,
Shanghai

REPUBLIC TRUCK SALES CORPORATION,
Alma, Michigan, U.S.A.
Cable Address : REPUBLIC

Humber

STANDARD MODELS.

11.4 h.p. 2-Seater (with double Dickey Seat)
11.4 h.p. Coupé (with double Dickey Seat)
11.4 h.p. 4-Seater 15.9 h.p. 5-Seater
11.4 h.p. Saloon 15.9 h.p. Saloon

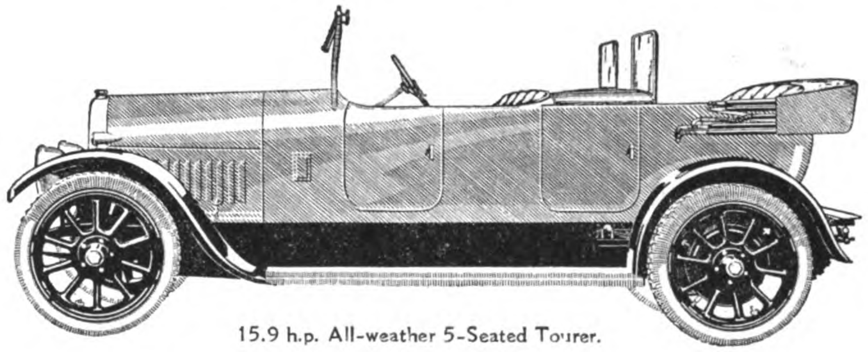
HUMBER LIMITED.
Works:
COVENTRY, ENGLAND.
Export Dept.:
Humber House, 94 New Bond St.,
LONDON.

The High Average Car

RIGHTLY acclaimed as "a model of luxurious comfort and superb refinement," the Humber 15.9 h.p. 5-seater Touring Car is indeed a triumph of engineering skill and accomplishment.

It is described by independent Motor experts as exactly what a 5-seated owner-driver's car should be in the matter of general arrangement and equipment of both chassis and body.

All Humber Cars are fitted with detachable steel Artillery Wheels suitable for all climates. All open models are fitted with the Humber All-weather Hood (with side curtains opening with the doors) which provides for complete protection even in tropical rains.

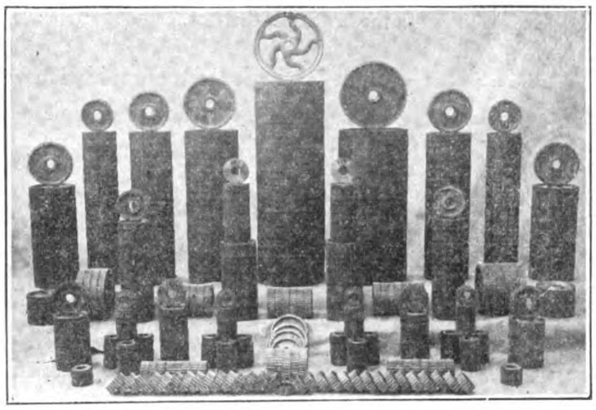


15.9 h.p. All-weather 5-Seated Tourer.

Associated British Machine Tool Makers, Limited.

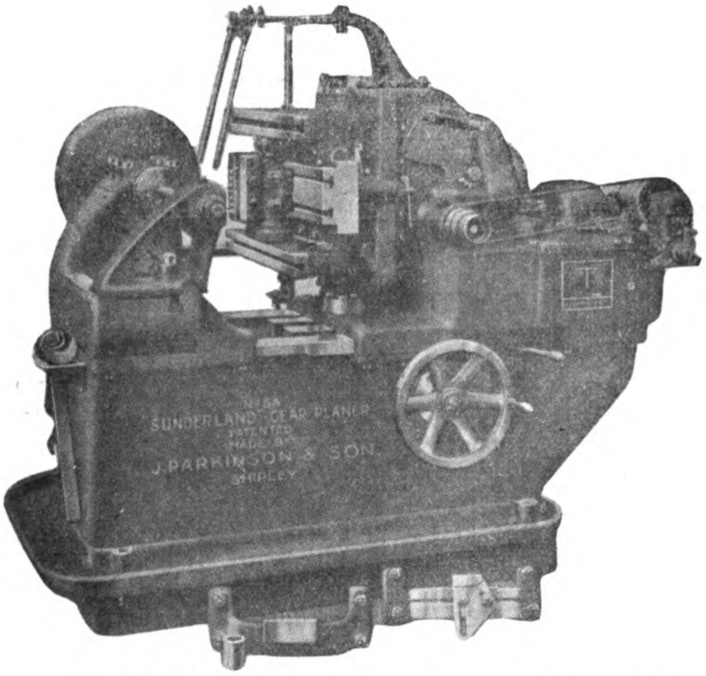
LOOK FOR

THIS TRADE MARK



LOOK FOR

THIS TRADE MARK



TEST MADE. 510 Wheels=25,500 Teeth in 19½ hrs. This equals an output of 220 Wheels=11,000 Teeth in 8½ hr. day, or 81-ft. of Tooth finished per hr.

No. of Teeth	No Off	Total No. of Teeth	Time per Gear Including Mounting
100	30	3,000	3 mins. approx.
98	30	2,940	3 ,, ,,
76	30	2,280	2.4 ,, ,,
67	10	670	2.2 ,, ,,
63	60	3,780	2 ,, ,,
59	30	1,770	2 ,, ,,
50	10	500	1.7 ,, ,,
47	70	3,290	1.7 ,, ,,
42	60	2,520	1.7 ,, ,,
40	10	400	1.7 ,, ,,
34	40	1,360	1.8 ,, ,,
23	130	2,990	1.4 ,, ,,
Total	510	25,500	

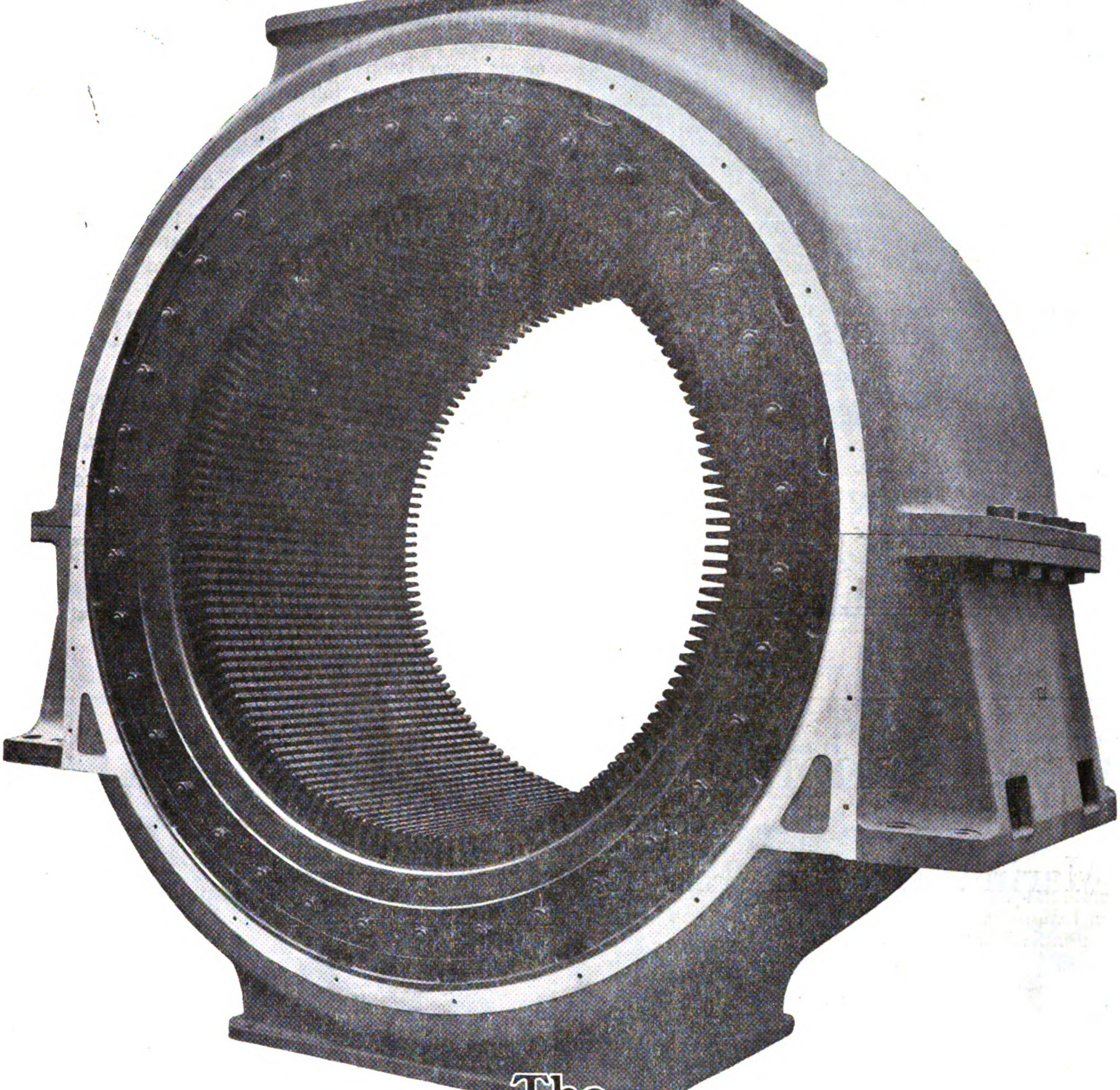
SOLE AGENTS:

Jardine, Matheson & Co., Ltd.

CANTON	HANKOW	ICHANG	TIENTSIN
CHENGTU	HARBIN	PEKING	TSINGTAO
CHUNGKING	HONGKONG	SHANGHAI	ETC.

Bring Your Gear Cutting Problems to Us.

10,000 H.P.
WATER DRIVEN ALTERNATOR



The

ENGLISH ELECTRIC
Company Limited.

WORKS:-

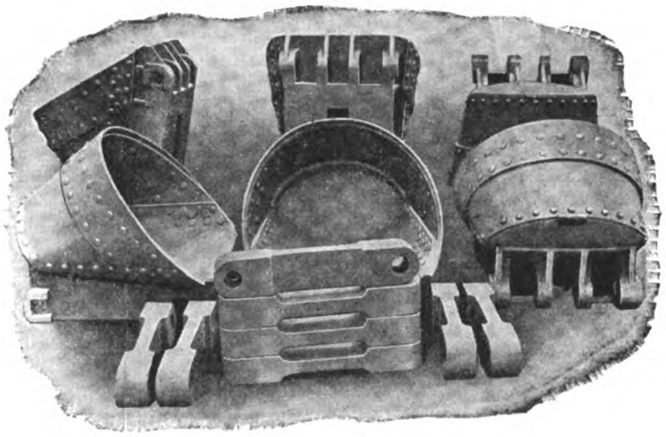
DICK, KERR WORKS, PRESTON. ORDNANCE WORKS, COVENTRY.
PHŒNIX WORKS, BRADFORD. SIEMENS WORKS, STAFFORD.
WILLANS WORKS, RUGBY.

HEAD OFFICE:-

Queen's House, Kingsway, London, W.C. 2.

TELEPHONE — — — — — — — — — — — — HOLBORN, 830.

China Office: JARDINE, MATHESON & CO., LTD., Engineering Dept., 8a Yuen-Ming-Yuen Road, Shanghai
Japan Office: THE ENGLISH ELECTRIC CO., LTD., Yuraku Buildings, Marunouchi, Tokyo



"Imperial" Manganese Steel

"Imperial" Manganese Steel, whether used for the lips of dredger buckets, the bucket chain links, pins or bushes, means fewer stoppages due to breakage or rapid wear. As an example, the following extract from a letter may be quoted: "Up to the time I left West Africa the three bucket dredgers (gold dredging)

did not break a pin.

One dredge has been at work nearly two years, and the other two six months. I think the wear of the pins constitutes a record." What would a record like that mean to you in money saved?

The Makers of "Imperial" Manganese Steel

are

Edgar Allen & Co. Ltd.
Imperial Steel Works
Sheffield

CHINA

Agents:

JARDINE, MATHESON & CO., LTD.
8a Yuen-Ming-Yuen Rd., Shanghai
and at
Hongkong, Hankow, Tientsin, Peking, Etc.

JAPAN

Branch Office:

EDGAR ALLEN & CO., LTD.
2 Mitsu Bishi Buildings,
1 Yaesu-Cho, Kojimachi Ku,
TOKYO

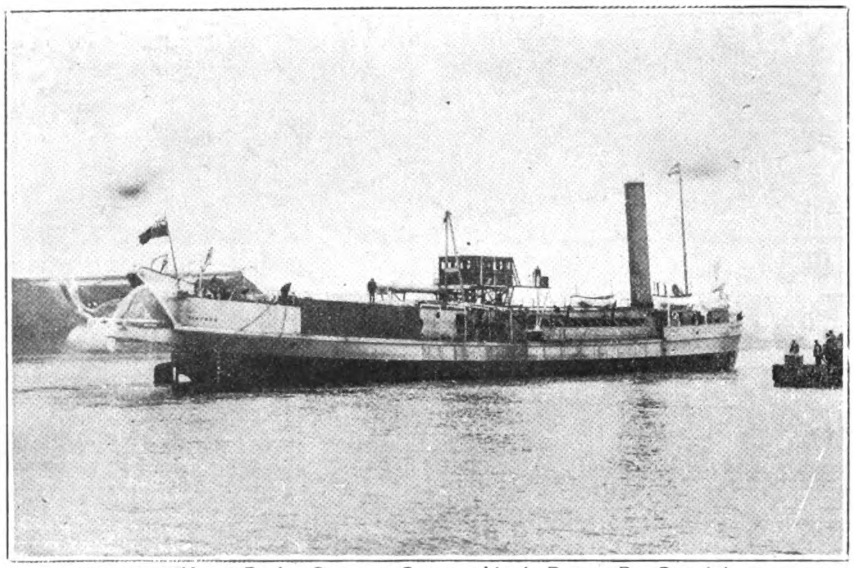
Wm. Simons & Co., Ltd., Renfrew

CONSTRUCTORS OF

Marine Dredging Plant

of most Modern and Improved Types and of the Greatest Capacities.

Constructors of Barge Loading, "Simons" Reclamation, Canal and Suction Cutter Hopper Dredgers. Hopper and Barge Loading Bucket Dredgers. Alluvial Dredgers. Trailing Suction Dredgers.



Drag Suction Hopper Dredger *Cormorant*, Constructed for the Rangoon Port Commissioners

Propelling and Dumb Hopper Barges.

Replace Parts supplied or fitted to existing Dredgers.

Inventors and First Constructors of "Hopper" and "Sternwell" Dredgers and Elevating Deck Ferry Steamers.

Head Office and Works: Renfrew, near Glasgow.

Telegrams: "Simons" Renfrew.

Established 1810

AVERY

The Importance of accuracy.

THE PARAMOUNT FACTOR IN ALL WEIGHING OPERATIONS, IS ACCURACY.

IT IS VITALLY IMPORTANT WHERE ESTIMATES OF VALUE, ARE DETERMINED BY WEIGHT.

LOSSES DUE TO UNRECORDED INACCURACIES ARE UNRECOVERABLE, THEREFORE THE VALUE OF ACCURACY IS INDISPUTABLE.

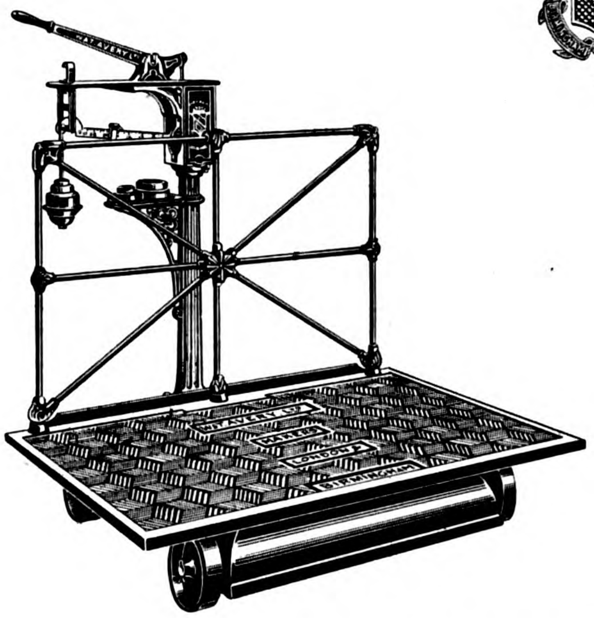
THE HIGH DEGREE OF ACCURACY AND ALL-ROUND EFFICIENCY OF

AVERY MACHINES

IS "PRACTICAL REASON" WHY THEY MAINTAIN SUPREMACY IN THE MARKETS OF THE WORLD

Agents:

JARDINE, MATHESON & CO., LTD.
SHANGHAI.



W. & T. AVERY LTD
SOHO FOUNDRY
BIRMINGHAM, ENGLAND.

A.Q.476.

CANADIAN CARBIDE GIVES MORE GAS PER POUND

AND GAS IS WHAT YOU ARE BUYING

Export Drum with Wood over Cask

Years of manufacturing experience, plus facilities for quantity production assure highest gas yield and moderate prices.

CANADA CARBIDE CO., LTD.

Power Building, MONTREAL, CANADA.

Manufacturers and Exporters of

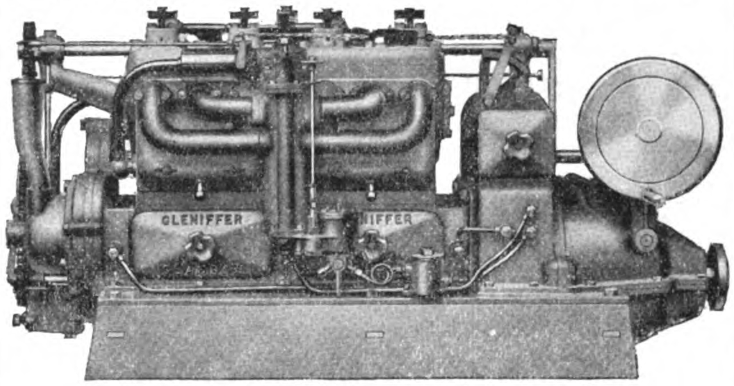
"S" BRAND HIGH-GRADE CARBIDE OF CALCIUM

Cable Address: CARBIDE, Montreal, Canada

Western Union, Bentley's and A.B.C. 5th Edition Codes.

GLENIFFER

KEROSENE & PETROL MARINE MOTORS



FOR ALL TYPES OF BOATS

RANGE OF MODELS—10 TO 90 H.P.

EASTERN AGENTS:

China—Jardine, Matheson & Co., Ltd., Shanghai.
Federated Malay States & Straits Settlements—Ritchie and Bisset, 23 and 25 The Arcade, Singapore.
Burma—Douglas and Grant, Ltd., 75 Merchant St., Rangoon.
Siam—Douglas and Grant, Ltd., Ban Mai, Bangkok.
French Indo-China—Douglas and Grant, Ltd., P. O. Box 127, Quai de Belgique, Saigon.
Dutch East Indies & Timor—British and Dutch Engineering Co., Ltd., at Soerabaia, and at Batavia.

GLENIFFER MOTORS, LTD.

ANNIESLAND, GLASGOW, SCOTLAND.

TELEGRAMS: "GLENGINE, GLASGOW."

SALE & FRAZAR

S F

LIMITED
No. 1 Yayesucho, Kojimachi-Ku
TOKYO
Central Post Office Box No. 18

IMPORTS EXPORTS

Telegraphic Address: "FRAZAR"

Since 1834 The Name "FRAZAR" For All Offices has been Connected

WITH

ORIENTAL TRADE

BRANCHES - - - - Yokohama, Kobe, Osaka, Kyoto, Moji, Hakodate, Nagoya, Keijo (Korea), Taihoku (Formosa), Mukden (Manchuria), Vladivostok (Siberia.)

AFFILIATED COMPANIES -
FRAZAR & CO., 30 Church St., New York, and Paris, Seattle, San Francisco.
FRAZAR TRUST CO., LTD., Tokyo and Yokohama.
FRAZAR FOREIGN TRADE BUILDING CO., New York.

CORRESPONDENTS - -
SALE & CO., 21 Old Broad St., London, E.C.
F. G. SALE & SONS, 20 Bishops Gate, London, E.C.
E. W. FRAZAR & CO., 5 Rue de Paris, Tientsin and Peking, Harbin, Mukden.

WORLD-WIDE CONNECTIONS
EXCLUSIVE AGENCIES IN ALL LINES
LARGE STOCKS

A FEW OF OUR AGENCIES

MANY OTHER EXCLUSIVE AGENCIES

MOTORCARS, TRUCKS, TRACTORS, ETC. Ford Motor Co., Hupmobile Motor Car Corp., Franklin Motor Car Co., Armstrong Siddeley Co., Ltd., Rolls Royce Co., Ltd., The White Co. (Trucks). Splitdorf Electrical Co.
MACHINE TOOLS. Joseph T. Ryerson & Son, Giddings & Lewis Mfg. Co., Wm. Sellers & Co., Inc.
RAILWAY EQUIPMENT. Baldwin Locomotive Works, W. H. Miner, Griffin Wheel Co., Duff Mfg. Co.
AVIATION EQUIPMENT: Handley Page, Ltd.
BRITISH STEEL and STEEL PRODUCTS. Jonas and Colver, Ltd., Smith & Coventry, Ltd., Sheffield Twist Drill & Steel Co., Ltd., Chubb & Son's Lock & Safe Co., Ltd.
CANNING MACHINERY and EQUIPMENT. American Can Co., Adriance Machine Works, Anchor Cap & Closure Co., Burpee and Letson Ltd., Seeley Brothers.
CANNED SALMON and CRAB from Kamchatka.
Fairbanks Morse & Co. Stationary and Marine Engines. Motors, Pumps, Wind Mills, complete Power and Lighting Plants.
Chain Belt Co., "Rex" Concrete Mixers.
J. L. Mott Iron Works, Plumbing Fittings and Supplies.
Shepard Electric Crane & Hoist Co., Cranes and Hoists.
Armour & Co., Canned Meats and Fruits, Soaps, Toilet Articles.
The Carnation Milk Products Co., "Carnation Cream."
The Glidden Co., Paints, "Jap-a-lac" Auto Finishes, Cold Water Paints, Wood Stains.
The Duratex Co., "Duratex" Leather Substitute and Rubber Coated Top and Curtain Materials.
S. C. Johnson & Son, Floor Wax, Paste, Liquid, and Powder.
The Klein Manufacturing Co., Technical Paints "Metal Crete" Concrete Hardeners, Cement Coating.
The Tungsten Wire Works (Stockholm), Wires for Filaments.
The Victor Talking Machine Co., Machines and Records.
The Graphoscope Development Co., Projectors and Films.
The Victor Typewriter Co., Standard Typewriters.
The Corona Typewriter Co., Folding Typewriters.
The Rolex Watch Co., Ltd., "Rolex" Watches.
Simmons Hardware Co., "Keen Kutter" and "Oak Leaf" Brands of Tools and Cutlery.
The Gillette Safety Razor Co., "Gillete" Blades.
ROAD, EXCAVATING, POWER HOUSE, REFRIGERATING MACHINERY: STEEL and IRON PRODUCTS: "Gould" STORAGE BATTERIES.
RADIO APPARATUS, HEATING EQUIPMENT, FERTILIZERS, SAWN TIMBER CHEMICALS.
OUR SERVICE also covers BONDS and INVESTMENTS, FIRE and MARINE INSURANCE, SHIPPING, STORING, CHARTER, SALE and PURCHASE of STEAMERS.

INQUIRIES SOLICITED - If we cannot Supply your Requirements from Stock, we will be pleased to Recommend Local Alternatives or Advise Regarding Imports.

FIREPROOF
Ambler
Asbestos Corrugated Roofing

Made of selected asbestos fibres and the best hydraulic cement, compressed into compact sheets under three thousand pounds pressure per square inch, Ambler Corrugated Roofing and siding cannot burn, rust, rot, split nor leak. Made in sheets twenty-seven and one-half inches wide with eleven complete corrugations, and in lengths of four, five, six, seven, eight, nine and ten feet to be applied directly on purlins with lead washers and either bolts or aluminium tie wires, furnished. This material is unaffected by heat or cold or climatic conditions. Send for our data sheets showing method of use. Address all inquiries to Export Department "B."

"Permanent as the Everlasting Hills"

NO PAINTING—NO REPAIRING

Manufactured by

Asbestos
Shingle, Slate & Sheathing
Company

Ambler, Penna., U.S.A.

Distributors Wanted throughout the East

Cable Address:
"IWASAKISAL-TOKYO"

Code Used:
A. 1., A.B.C. 5th, Western Union, Bentley's Complete Phrase

MITSUBISHI SHOJI KAISHA, LTD.

(MITSUBISHI TRADING CO., LTD.)

Capital, fully paid-up - - - Y. 15,000,000

***Head Office*:**

MARUNOUCHI, TOKYO.

Importers and Exporters, Manufacturers, Commission Merchants, Brokers, Ship Owners.

EXPORTING:

Coal, Copper and all Other Descriptions of Metals, Minerals and Cereals, Chemicals, Oil, Paper, Glass, Canned Fish, Silk Goods, and General Oriental Products and Merchandise

IMPORTING:

Iron, Steel, Machinery, Machine Tools, Chemicals, and General Merchandise

ANNUAL PRODUCTION:

Electrolytic Copper Ingots	20,000	Tons
Pig Iron	100,000	,,
Steel	50,000	,,
Coal	3,500,000	,,

COLLIERIES:

Takashima, Ochi, Yoshinotani, Kishidake, Namazuta, Shinnew, Hojo, Kanada, Kamiyamada, Ashibetsu, Bibai, O-Yubari, and Sakito

BRANCHES and AGENCIES:

Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle

STEAMSHIP DEPARTMENT—KOBE

Fleet Owned	25,000	Tons Gross
Chartered Steamers	12,000	,, ,,

Regular and Irregular Routes between home ports and Chinese and South Sea Islands Ports, etc.

MIIKE COAL

The Finest Steaming and Bunker Coals of the Far East are mined from the famed Miike, Tagawa, Yamano Sunakawa and Kawakami Collieries operated by the

MITSUI

MINING COMPANY, LTD

HEAD OFFICE:

No. 1 Surugacho, Nihonbashi Ku,
TOKYO, JAPAN

Capital - - Yen 100,000,000

Annual Coal Output is equal to one-quarter of Total Japanese Mines.

LEAD, SILVER, GOLD, ZINC, COPPER, SPELTER, SULPHUR, COKE, IRON, CHEMICALS and DYES

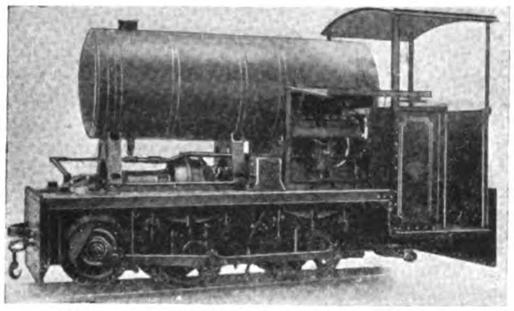
Are produced from the Company's, KAMIOKA, Lead, Silver and Zinc Mine; SANO, Copper and Zinc Mine; KUSHIKINO, Gold Mine; KONGO, Tungsten Mine; IWAONOBORI, Sulphur and Metal Mine; Zinc Plants, Coke, Dyestuffs and By-products Establishments in Miike.

***Sole Agents for our Products*:**

MITSUI BUSSAN KAISHA, Ltd.

(MITSUI & Co., Ltd.)

Tokyo, London, New York, Shanghai, Hongkong, and other Principal Commercial Centres of the World.



Contractors to: The Admiralty, The War Office, The India Office, The Crown Agents for the Colonies, Colonial and Foreign Governments

Internal Combustion Rail Cars, Inspection Cars, Coaches, Tramcars, Trailers, Locomotives, Tractors, etc.

British built throughout and supplied to upwards of 200 Railways in all Parts of the World

Designs to meet individual requirements

The Drewry Car Co., Ltd.

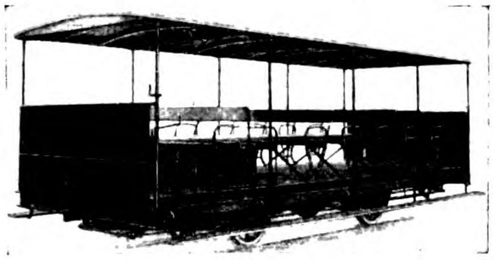
(and McEwan Pratt & Co., Ltd.)

13 South Place, London, E.C. 2

Telegrams: "Effervesce, London"

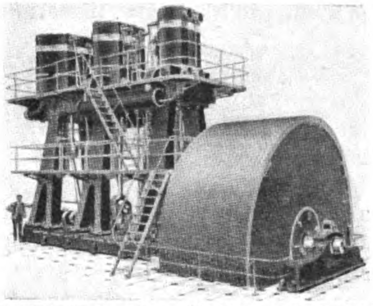
Works: Burton-on-Trent, England

Passenger	Mining	Plantations
Freight	Harbours	Logging
Shunting	Docks	Contractors



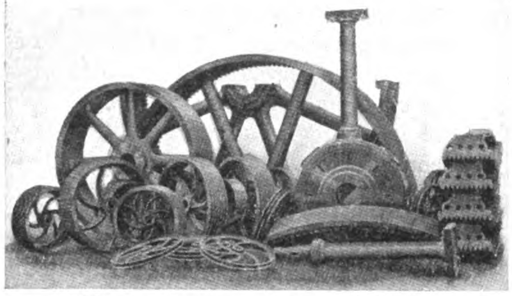
ASHTON FROST & CO., LTD.

ESTABLISHED 1873.



MAKERS OF

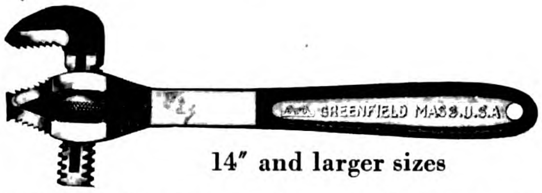
STEAM ENGINES,
MILL GEARING,
DEEP WELL PUMPS,
SEWAGE PLANT,
ETC.



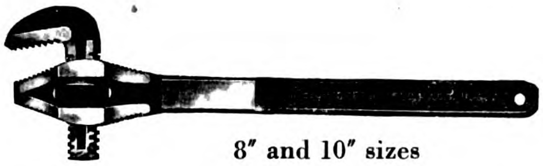
TELEGRAMS: "FOUNDRY."

WORKS: BLACKBURN, ENG.

Little Giant—The New Pipe Wrench



14″ and larger sizes



8″ and 10″ sizes

A new design which gives increased strength, increased simplicity, increased usefulness, *less* weight, and fewer parts.
The "*Little Giant*" Pipe Wrench has become popular at once because of the end opening jaws. It can be thrust straight on a pipe like a pair of pliers, and will be found useful in places which are beyond the reach of an ordinary pipe wrench.

The arrangement of the jaw, which can be engaged at will with 2 or 4 sets of teeth on the handle can be seen in the picture. These extra sets of teeth mean long life. The "*Little Giant*" Wrench is drop-forged and heat-treated throughout.
Merchants will be particularly interested in the light weight (less than an ordinary pipe wrench) and the few parts. The "*Little Giant*" has only 3 parts, which means a smaller investment in replacements. Any of our representatives will be glad to quote prices.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASS., U.S.A.

Canadian Plant: Greenfield Tap & Die Corporation of Canada, Limited, Galt, Ontario.
Cable address: "Getede"

MULLER, PHIPPS & SELLERS, LTD.	MULLER & PHIPPS (CHINA) LTD.	DODGE & SEYMOUR (CHINA) LTD.	HORNE COMPANY LTD.
17 Itachibori Kitadori 5-chome, Nishi-Ku Osaka, Japan Fudo Bank Bldg., 9.2-chome Honkokucho, Nihonbashiku Tokyo, Japan	5 Ice House St. P. O. Box 25, Prince's Bldg., Hongkong, China 1 B Jinkee Road Shanghai, China	89-91 Rue Montauban, Shanghai, China	63 Rue de Baron Gros, Tientsin, China 6-7 Takayama-cho Kyobashi-Ku Tokyo, Japan

Plants of GTD Corporation, World's Largest Manufacturers of Screw-threading Tools

The Green Island Cement Co., Ltd.

SHEWAN, TOMES & CO.,

GENERAL MANAGERS, HONGKONG

Are You Going to Build?

Insist on your Architect specifying the use of the best brand of Portland cement in construction. If the house or factory is to be blocks or tiles, they should be of concrete, if stucco, only the best cement should be employed; if reinforced concrete is used, only a standard cement will stand the test; if your building is to be fireproof, waterproof, safe against earthquake or typhoon, improving with age, and lowering the cost of insurance, you must employ concrete, and the best concrete construction is only secured through the use of

Green Island Cement

Green Island Cement is supplied in Bags = 250-lbs. net, Casks = 375-lbs. net, Iron Drums = 375-lbs. net.

Also, Glazed Stoneware, House Drains, Sewer Pipes, and Fittings, Paving Bricks, Tiles, Fire Bricks and Fire Clay.

The Green Island Brand has become the standard Portland Cement of Asia, owing to its purity, uniformity and tests.

Used by H.B.M.'s Government in Hongkong, United States Government in the Philippines for all important Public Works.

Also by H.B.M.'s Government in Singapore and Federated Malay States for Government Buildings, Railways and Harbour Works.

Established 1883 Telegraphic Address "ROPEWORK," HONGKONG

THE HONGKONG ROPE MANUFACTURING Co., Ltd.

Manufacturers of Pure Manila Hemp Rope

Rope supplied to the British Navy on the China Station and to all Mail and regular Steamship Lines.

Ropes, Cables and Hawsers ½-in. to 15-in. Circumference. Driving Ropes for Mills; Bull Ropes and Drilling Cables for Oil Wells a Specialty.

SHEWAN, TOMES & CO.

General Managers

St. George's Building HONGKONG.

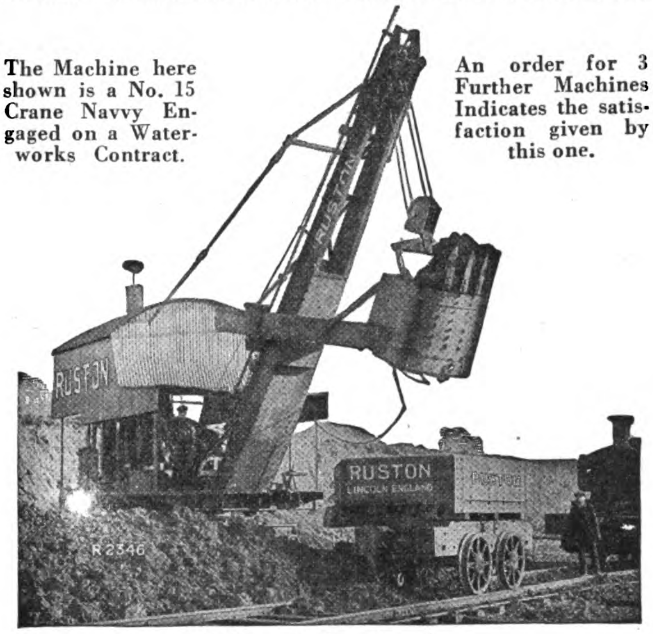
ECONOMICAL EXCAVATIONS

RUSTON EXCAVATORS—Crane Navvies Shovels, and Draglines have proved their efficiency on all classes of excavations in all parts of the world.

Wide Range of Machines available on Rail Wheels, Road Wheels or Caterpillar Tracks.

The Machine here shown is a No. 15 Crane Navvy Engaged on a Waterworks Contract.

An order for 3 Further Machines Indicates the satisfaction given by this one.



Full particulars from:—

RUSTON & HORNSBY LTD., LINCOLN, England.

OR

MARTIN & CO., CALCUTTA.
ARNHOLD BROTHERS & CO., LTD, SHANGHAI.
UNITED ENGINEERS LTD, SINGAPORE.

The JANNEY-PENN Coupler

THE latest development of the Janney type of M. C. B. Coupling originally introduced and promoted by this company. This coupler has all the simplicity of the early type of the Janney coupler, and also has the up-to-date features of a "Lock-to-the-Lock," "Lock-Set," and a "Knuckle-Opener," and complies fully with all the requirements and recommendations of the M. C. B. Association of the U. S. A.

This coupler has the desirable feature of easy accessibility of parts, thus facilitating the making of repairs.

Furnished with various designs of rear end to suit different types of Draft Rigging.

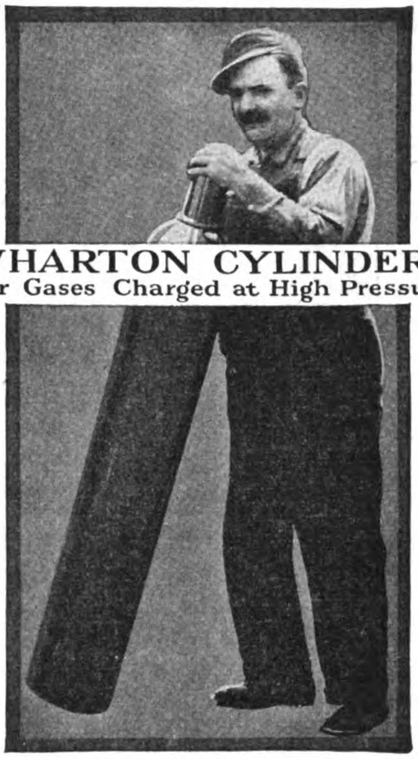
Manufactured exclusively by

THE McCONWAY & TORLEY CO.

Pittsburgh, Pa., U. S. A.

Cable Address—Torley, Pittsburgh

China Agents: The Fearon, Daniel Co., Tientsin, Peking, Hankow and Shanghai, China



Better than Requirements!

It is not sufficient that Wharton Cylinders merely meet standard British and American specifications—they have built into them safety and endurance factors beyond requirements.

They are made from Wharton Special Cylinder Steel *billets.* They undergo six rigid tests during the manufacturing process and a final hydrostatic test. We furnish official test certificates with them. They are furnished with or without caps and valves. Deliveries are prompt.

For oxygen, acetylene, hydrogen, carbonic acid, nitrous oxide, sulphur dioxide, liquid chlorine, blaugas, etc., they have no equal.

Write us for full specifications, sizes, weights, test pressures and prices.

The parent company—Taylor-Wharton Iron & Steel Co.—is 180 years old. It manufactures manganese steel frogs, switches, crossings, gears, pinions, dipper teeth, buckets, crushing and grinding machine parts, etc.

Representatives Desired for Wharton Cylinders

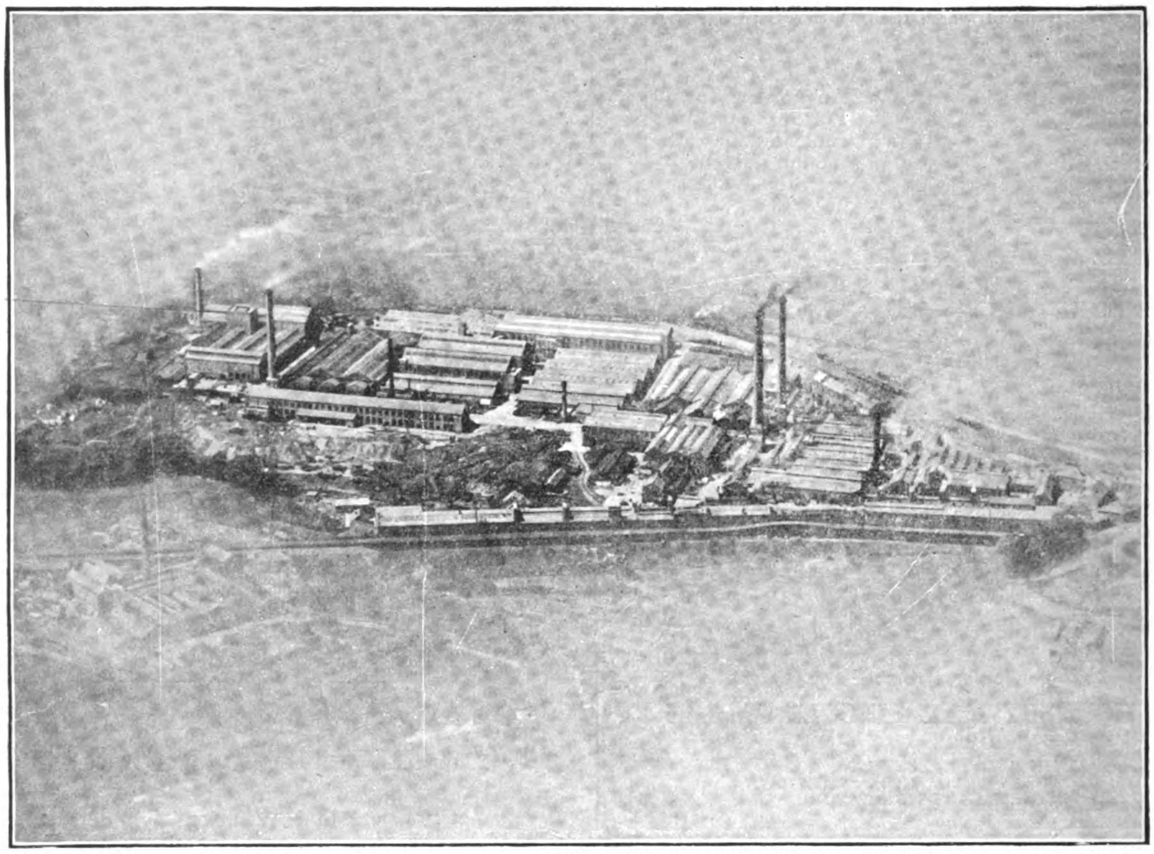
Concerns and individuals desiring to represent us are invited to write. Our facilities in manufacture and service, our reputation, stability and the worth of our product make this an unusual opportunity.

Wm. Wharton, Jr. & Co., Inc.

(Founded 1859)

30 Church St., New York, U. S. A.

Cable, Wilwharton, New York



FAMOUS FACTORIES KING'S NORTON METAL WORKS

These Works, belonging to the King's Norton Metal Co., Ltd., situated at Birmingham, form part of the Metal Section of Nobel Industries Limited.

For over thirty years this firm has been famous for the high quality of its metals. The new Rolling, Wire Drawing and Extrusion Mills are fully equipped with up-to-date plant for the production of all kinds of non-ferrous metals in strip, sheet, wire, rod, or section form. A considerable proportion of the metal so manufactured is worked up on the premises into finished or semi-finished products. Minting is one of the Company's specialities—large quantities of finished Coins being made for the Home, Colonial and Foreign Governments.

High quality is maintained by working to rigid specifications, by controlling manufacture at all stages by laboratory supervision, and by passing all products to an Inspection Department for examination prior to despatch.

Other products manufactured at the Factories controlled by Nobel Industries Limited include :—Blasting Explosives and Accessories, Industrial Collodions, Incandescent Mantles, Bicycles and Accessories, Stoves, Lamps, Bronze and Aluminium Powders, Art Leather Cloth, etc., etc.

Particulars can be obtained from :—

NOBEL NOBEL INDUSTRIES LIMITED NOBEL

Head Office :

NOBEL HOUSE, LONDON, S.W.1

Write to the Advertising Department, Nobel House, for illustrated booklet "The Products of Nobel Industries, Ltd." mentioning this Journal.

UNITED STATES STEEL PRODUCTS COMPANY

30 Church St., New York, U.S.A.

Sole Exporters of the Products of

Carnegie Steel Company
Illinois Steel Company
American Steel & Wire Company
American Sheet & Tin Plate Company
The Lorain Steel Company
American Bridge Company
National Tube Company
Tennessee Coal, Iron & Railroad Company
Minnesota Steel Company
Canadian Steel Corporation
Chickasaw Shipbuilding and Car Company

BRANCH OFFICES and REPRESENTATIVES IN

Antwerp, Belgium
Birmingham, England
Bombay, India
Brussels, Belgium
Buenos Aires, Argentine Republic
Calcutta, India
Concepcion, Chile
Glasgow, Scotland
Havana, Cuba
Johannesburg, South Africa
Lima, Peru
Los Angeles, California
London, England
Mexico City, Mexico
Montreal, Canada
New Glasgow, Canada
New Orleans, La
Peking, China
Port Elizabeth, South Africa
Portland, Oregon
Rio de Janeiro, Brazil
Rome, Italy
Rotterdam, Holland
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Seattle, Washington
Soerabaya, Java
Sydney, New South Wales
Tokio, Japan
Toronto, Canada
Valparaiso, Chile
Vancouver, Canada
Winnipeg, Canada

WAREHOUSES AT

Antwerp, Belgium
Bombay, India
Buenos Aires, Argentine Republic
Calcutta, India
Callao, Peru
Port Elizabeth, South Africa
San Francisco, California
Santiago, Chile
Sao Paulo, Brazil
Talcahuano, Chile
Valparaiso, Chile

We give prompt attention to inquiries for all class of our Steel Products, including the following :—

AERIAL TRAMWAYS—Reversible, specially designed
ALLOY STEEL
ALLOY STEEL SHEETS
AMMONIA CYLINDERS
ANGLES
ARMATURE SHEETS
AXLES—Locomotive, Railroad and Tramway Cars
BAMBOO STEEL
BARBED WIRE
BARS—Merchant and Concrete Reinforcement
BILLETS
BLACK SHEETS
BLOOMS
BOILER TUBES, Lapwelded and Seamless
BOLTS AND NUTS
BRIDGES—Railway, Highway, specially designed
BUILDINGS—Steel Warehouses, Structural Steel for Buildings
CABLES—Steel Hoisting and Haulage Cables
CARS—Steam Railway, Mine and Industrial Railway Cars
CAR ANGLES
CAR WHEELS
CHANNELS
COLD ROLLED FLAT WIRE
COPPER RAIL BONDS
COPPER BEARING STEEL SHEETS
DERRICKS
DRILLING MACHINES
DRILLING RIGS FOR OIL WELLS
DUQUESNE RAIL JOINTS
ELECTRICAL SHEETS
ELECTRICAL WIRES AND CABLES—Bare and Insulated
FABRICATED STRUCTURAL MATERIAL FOR BRIDGES, TURNTABLES, STEEL BUILDINGS, ETC.
FENCING MATERIALS—Wire Fencing, Steel Posts
FORGINGS
FROGS AND SWITCHES—Steam and Electric Railways
HOOPS AND BANDS
MACHINE FORGINGS
MINE TIMBERS
NAILS—Wire
NAIL RODS
NAIL WIRE
PIG IRON
PILING—Steel Sheet
PIPE—Black and Galvanized Wrought, for Steam, Gas and Water, American or English Threads; Lapwelded Boiler Tubes, Matheson Lead Joint Pipe, Seamless Steel Tubing
PLATES—Boiler, Tank, Ship, Flange and Fire Box Steel
POLES—Steel Tubular
RAILS—Light and Heavy Rails for Railways, Tramways, Mine and Industrial Railways. Special Track Work
REINFORCEMENT FOR CONCRETE—Triangle Wire Mesh
RIVETS
ROPE—Wire for Mine Hoists, Derricks, Cranes, etc.
SCREW SPIKES
SCREW STOCK—Cold Drawn
SHAFTING
SHAPES—Standard Structural
SHEET BARS
SHEETS—" Apollo " Brand, Galvanized, Corrugated and Plain
SKELP
SLABS
SPIKES—Railway Track Spikes
SLEEPERS—Steel
SPRING STEEL
STEAM PIPE AND TUBES
STOVE PIPE SHEETS
SWITCHES AND SWITCH STANDS
TANK PLATES
TERNE PLATES
TIN MILL PRODUCTS
TIN PLATE—" Coke," " Charcoal " and " Terne "
TOOL STEEL
TOWERS—Steel
TRIANGLE MESH CONCRETE REINFORCEMENT
TUBES—Gas, Water, Steam and Boiler
TURNTABLES FOR LIGHT AND HEAVY RAILWAY SERVICE
UPHOLSTERY SPRINGS
WASHERS
WEATHERPROOF INSULATED WIRES AND CABLES
WHEELS—Solid Rolled Steel for Steam, Electric, Mine and Industrial Railways.
WIRE—Bright, Annealed, Galvanized, Baling and Fencing and all Classes of Coated and Uncoated for Manufacturing Purposes.

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE: Union Building—The Bund and Canton Road

PEKING OFFICE : No. 22 Wu Liang Ta Jen Hutung

TOKYO OFFICE : No. 15 Nakadori, Marunouchi

OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President:
Baron K. Okura

BRANCHES at Hakodate, Yokosuka, Yokohama, Osaka, Kobe, Maizuru, Kure, Moji, Saseho, Keelung, Taihoku, Seoul, Antung, Penhsihu, Mukden, Tientsin, Peking, Hankow, Changsha, Kiukiang, Tsingtau, Hongkong, Vladivostok, Sydney, San Francisco, New York, London.

Head Office:
Ginza, Tokio

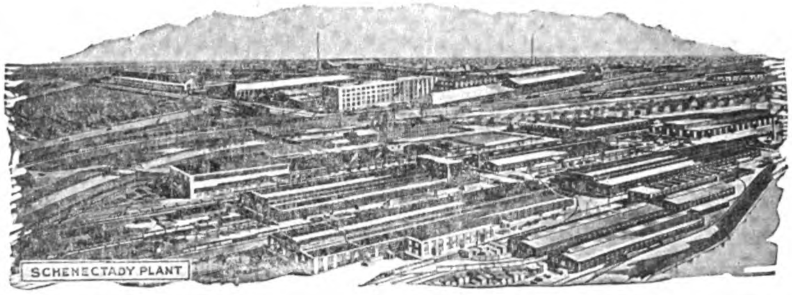
GENERAL IMPORTERS AND EXPORTERS

Rails, Bridges, Locomotives and other Railway Supplies
Electric Plants, Electrical Supplies
Sugar Plants, Spinning Machinery, Machine Tools
Factory Equipments, and all kinds of Machines
Automobiles, Guns and Explosives
Structural Materials, Steel Materials, Metals
Mineral Products, Chinese and Japanese Produce, Silk
Cotton, Wool, and their Manufactures
Fertilizers, Chemicals, Vegetable Oils and Wax, Dye Stuffs
Food Stuffs, Hides and Fur, Skins, Pen-hsi-fu Smokeless Coal and Pig Iron, etc.

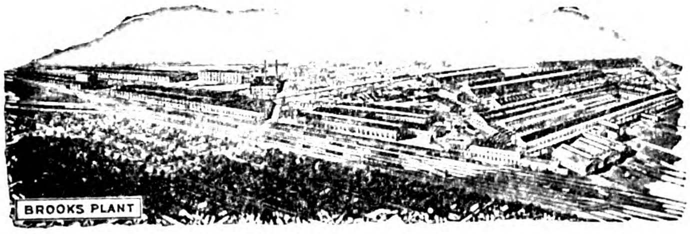
BUILDING AND CIVIL ENGINEERING CONTRACTORS,
INSURANCE AGENTS

Yih Chong Wharf (Okura)

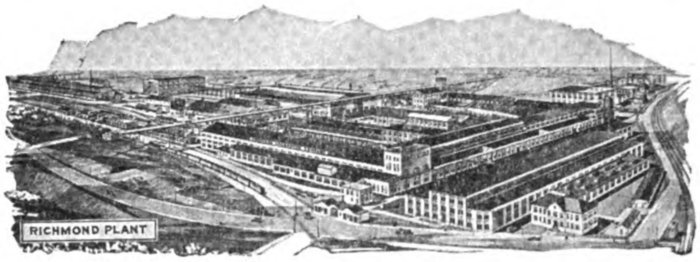
POOTUNG, SHANGHAI

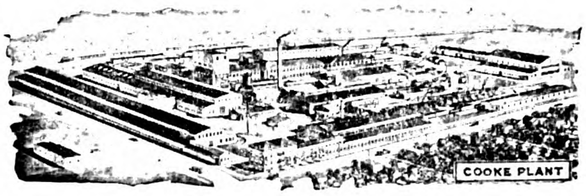


LOCOMOTIVES



Our organization is equipped to furnish every facility which long experience and abundant capital can provide for producing high-class work, and for conducting the business of manufacturing locomotives on the most economical basis to both purchaser and manufacturer.





American Locomotive Sales Corporation

New York City

Telegraphic Addresses :

Locomotive : Peking, China — Bamco : Sydney, Australia

Mitsui : Tokio, Japan — Nottac : Manila, P.I.

Dilpax : Honolulu, Hawaii

MITSUI BUSSAN KAISHA

Cable Address: "MITSUI"

Capital: Yen 100,000,000
Reserve: „ 30,000,000

LIMITED

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

IMPORTERS AND EXPORTERS

SHIPOWNERS AND SHIPBUILDERS

***Head Office*: TOKYO, JAPAN**

Branches:

HOME—Yokohama, Nagoya, Osaka, Kobe, Otaru, Muroran, Hakodate, Niigata, Moji, Wakamatsu, Kuchinotsu, Nagasaki, Karatsu, Miike, Taipeh, Keelung, Tainan, Takow, etc., etc.

ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soer baya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc., etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

---

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc , etc.

IMPORT.

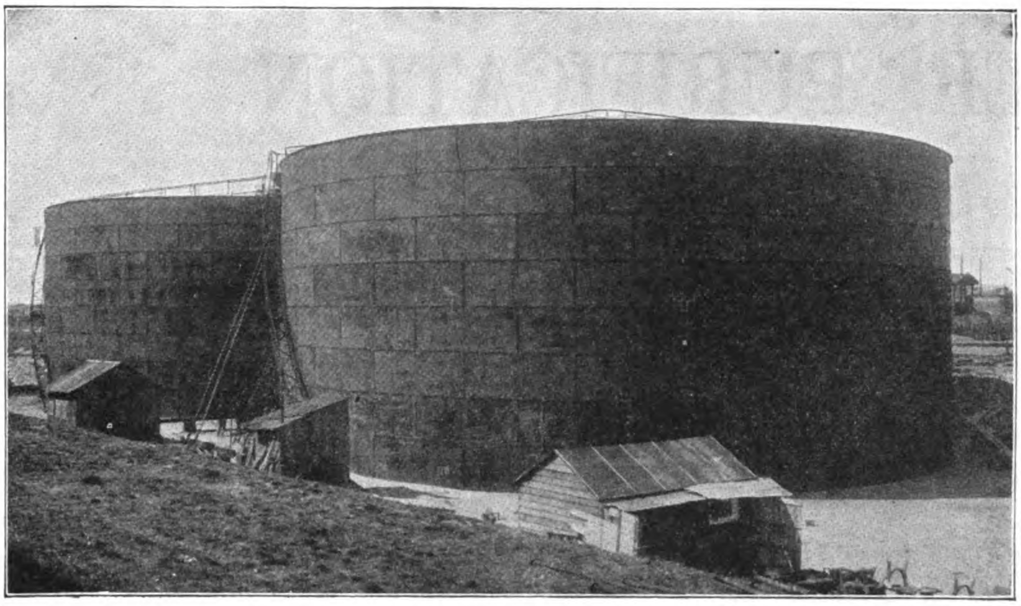
Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

ENGINEERING DEPARTMENT

Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Fxport Co.
Manning Maxwell & Moore, Inc.
Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc., etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



Two 50,000 Bbl. Tanks

We Design, Manufacture and Erect

Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.

McClintic-Marshall

Annual Capacity, 400,000 Tons

McClintic-Marshall Products Co.

Works: PITTSBURGH, U.S.A.

Foreign Contract Department, 50 Church Street NEW YORK, U.S.A.

Cable Address "Macmarsh" New York — *Codes* Bentleys, General, Western Union, Lieber

England: George A. Smith, St. Stephen's House, Westminster, S. W, 1, London

France: Produits Metallurgiques McClintic-Marshall, 8, Rue Edouard VII, Paris

South Africa: Robertson & Moss, 11-17 Trust Building, Johannesburg

China: Lam, Glines & Company, 4-B Peking Road, Shanghai

Japan: H. E. Root, 73 Yamashita-cho, Yokohama

Cuba: San Ignacio y Obrapia, Havana

Variety in Construction

Throughout the world we have been providing every variety of steelwork from the huge lock gates of the Panama Canal to all types of steel transmission towers, tanks, refineries, pipelines, etc.

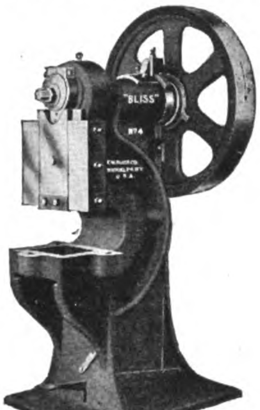
No job is too large nor too small for us to handle and you can be sure that we will do the work right. Send us your inquiries. *Write for booklet No. 30.*

McClintic-Marshall

Steel Construction

MACHINERY for Manufacturing Tin Cans—Tin Ware—Metal Packages Cutlery—Hardware—Aluminum Ware and Enamel Ware—Electrical Equipment. Also Horseshoe—Minting and Drop Forging Machinery

1857 BLISS 1922



No. 4 Stiles Punching Press, This type press is built in a large number of sizes and widely used for many operations in the manufacture of the general line of hardware.

On account of the radically different shape and construction of articles which make up the general line of hardware, it is impossible to give an outline of the operations required in its manufacture, as we did in previous advertisements covering other lines of manufacture.

The building of machinery for the economical production of practically every article in the hardware field and which is made of sheet metal, has been a specialty with us for many years.

Over 65 years of specialized effort in the Sheet Metal Industry has given us the ability to understand and successfully meet the problems of the manufacturer from the practical operating point of view.

" Bliss " on your machinery is more than a name; it is a guarantee.

E. W. BLISS CO. MAIN OFFICE AND WORKS **BROOKLYN, N. Y., U. S. A.**

American Factories: BROOKLYN, N.Y. HASTINGS, MICH. CLEVELAND, OHIO. SALEM, OHIO.

FOREIGN SALES OFFICES AND FACTORIES:

ENGLAND, Pocock St., Blackfriars Rd., S. E., London — ITALY, 345 Via Nizza, Turin — FRANCE, 54 Blvd. Victor-Hugo St. Ouen, Paris

FOREIGN REPRESENTATIVES:

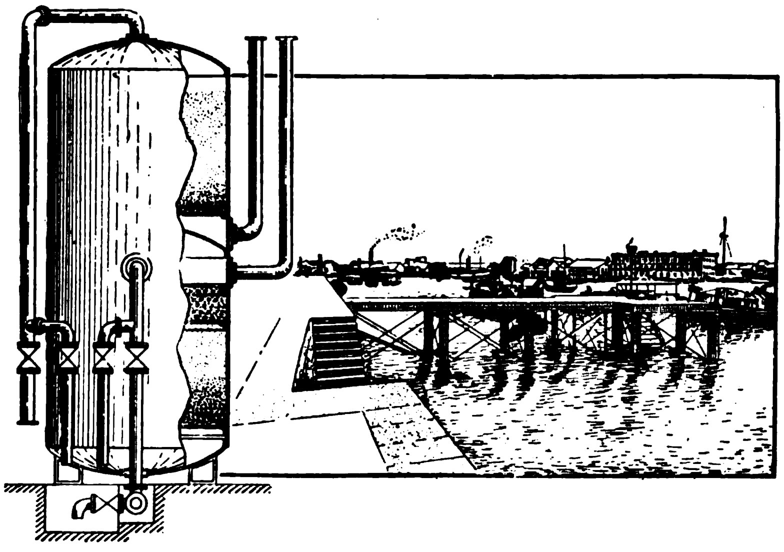
INDIA Alkin and Duff Eng. Co., Clive Bldg., Calcutta

CHINA Allied Machinery Co. of America, Shanghai, Tientsin, Dairen, Manchuria

JAPAN Horne Company, Ltd. Tokyo, Osaka

No. 244

WATER PURIFICATION



A Far Eastern Problem Solved

Left—Candy Patent "Mechanical Declor" Filter.

Right—View of Canton River showing the small pier under which is the suction intake pipe of the pumps. The muddy water, after being forced through the mechanical filter, "chlorified" and refiltered, comes out as an absolutely safe liquid fit for drinking purposes.

That impure drinking water breeds diseases is a fact upon which all health authorities agree. Natural water, even if clear and sparking in appearance, may yet contain dangerous bacteria and be capable of conveying diseases such as cholera, typhoid, etc.

To render a water supply absolutely safe for people's health, the mechanical type of filters such as the

CANDY FILTER

offers a great advantage over the old sand bed methods. With the Candy Filter a degree of sterilization can be obtained chemically which no amount of filtration through slow sand beds will ever approach.

Moreover, the cleaning of Candy Filters by a mechanical process is much more hygienic, rapid and simple; thereby increasing the filtering efficiency and reducing the areas of filter beds.

Installations of Candy Filters in China have proved their merit and adaptability. If you are interested in this profitable enterprise we will be pleased to furnish further information.

Andersen, Meyer & Co., Ltd.

Head Office—Shanghai

Canton, Hankow, Hongkong Mukden,
Peking, Taiyuan, Tientsin, Tsinan.

STANDARD OIL COMPANY OF NEW YORK

26 Broadway New York

The Mark of Quality

SOCONY PRODUCTS

Illuminating Oils Lubricating Oils

Gasoline and Motor Spirits

Lamps, Stoves and Heaters

Road Oils and Material for Road Building

Paraffine Wax and Candles

BRANCH OFFICES IN PRINCIPAL CITIES OF

Japan	Siam	India
China	Philippine Islands	South Africa
Indo-China	Straits Settlements	The Levant
	Netherlands India	

THE

HONGKONG & WHAMPOA DOCK CO.

LIMITED,

HONGKONG

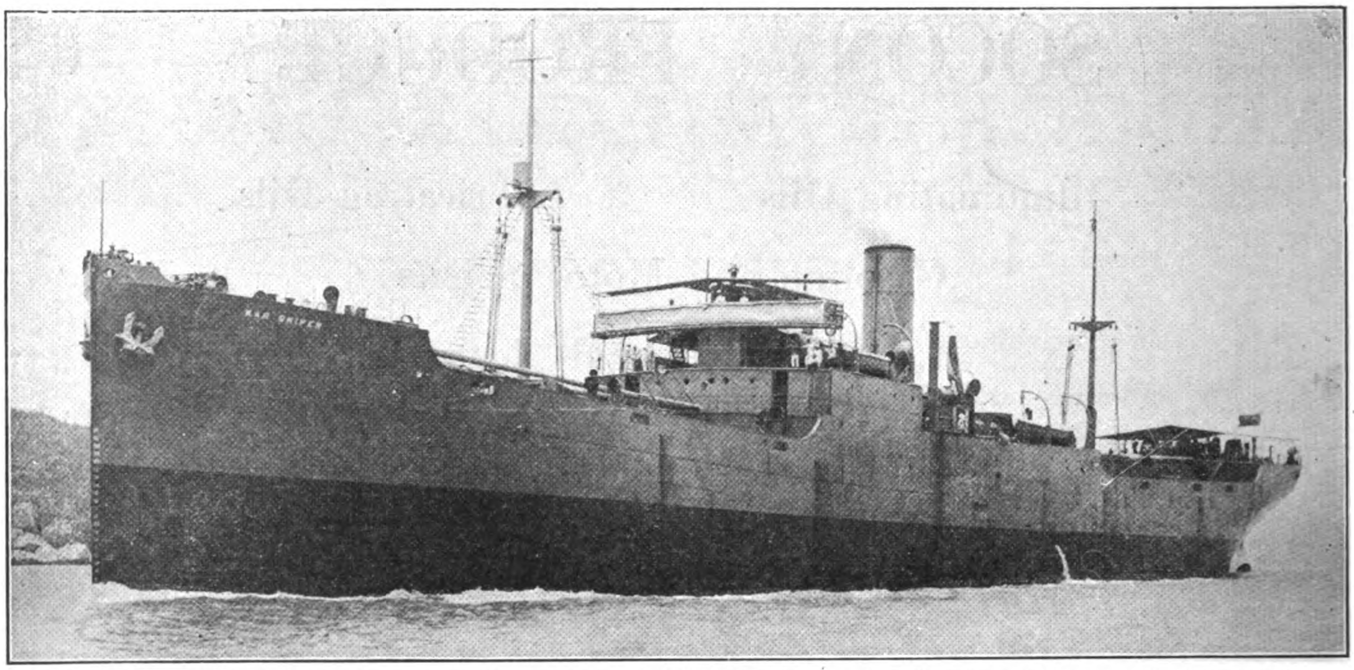
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

With Steel Plate or Cast Iron Frames

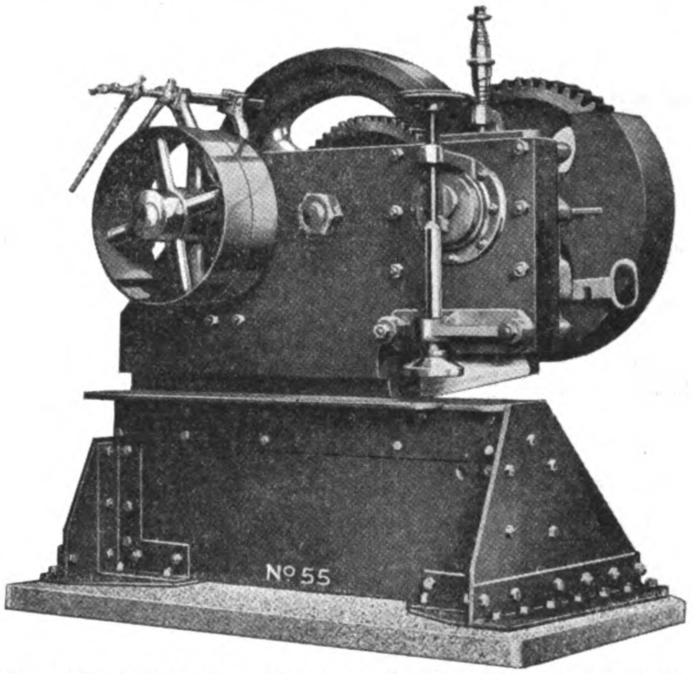


Plate Splitting Machine. For plates of unlimited length and width.

Punching and Shearing Machines.
Plate Bending Machines.
Plate Straightening Machines.
Plate Edge Planing Machines.
Plate Shearing Machines.
Steam Bending and Straightening Machines.
Bar Cropping Machines.
Multiple Punching Machines.
etc. etc.

CRAIG & DONALD LIMITED

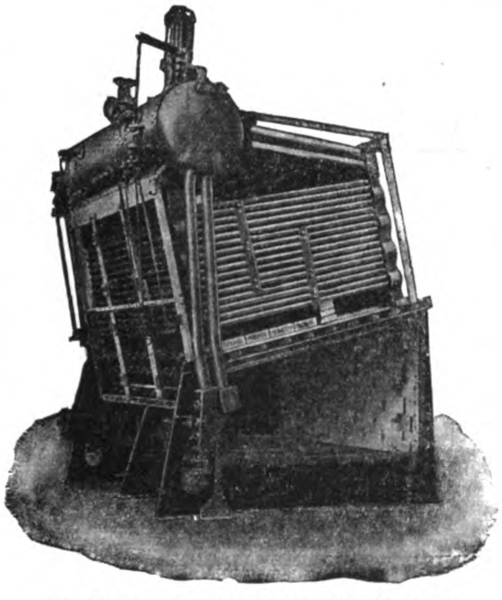
Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LIMITED

PATENT WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES, AND FOR BURNING ANY KIND OF FUEL

ALSO MAKERS OF "EXPRESS" TYPE LIGHT-WEIGHT BOILERS



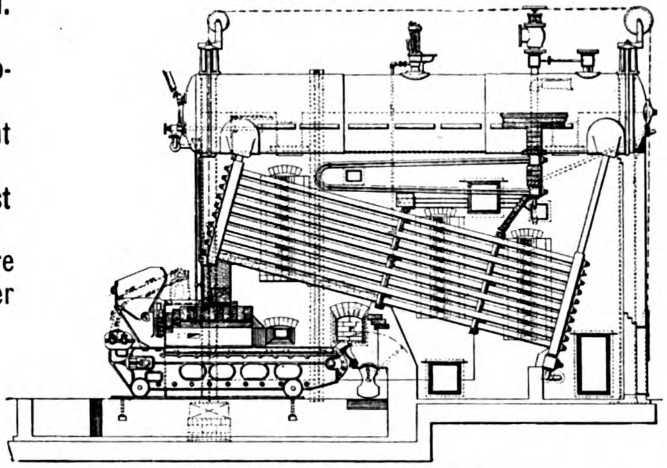
Babcock & Wilcox Marine Boiler

ADVANTAGES:

Simple in Design. Easy to Clean
Constructed of Wrought Steel. Rapid Steam Raiser
Economical in coal. Economical in Repairs
Very Durable. All Straight Tubes
No Screwed Joints. No Cast Metal
No Joints exposed to the Fire
Rapid Circulation of Water
Steady Water Level
Ample Steam Space

Largely installed in China and Japan

22,300,000 H.P. For Land And Marine Work installed or on order.



BABCOCK & WILCOX LAND BOILER, fitted with Patent Superheater and Chain Grate Stoker

For Burning Chinese and Japanese Coal Smokelessly

MANUFACTURERS OF

Steam Superheaters
Feed-Water Heaters
Coal Conveyors
Suction Ash Plants
Economisers
Water Softeners and Purifiers
Structural Work
Liquid Fuel Equipment
Mechanical Stokers
Steel Chimneys
Electric and Oil-driven Cranes

Complete Steam Piping Plants and all Boiler House Accessories

Head Office in China: 1 THE BUND, SHANGHAI
" " Japan: 1 1-CHOME, YURAKU-CHO, KOJIMACHIKU, Tokyo

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

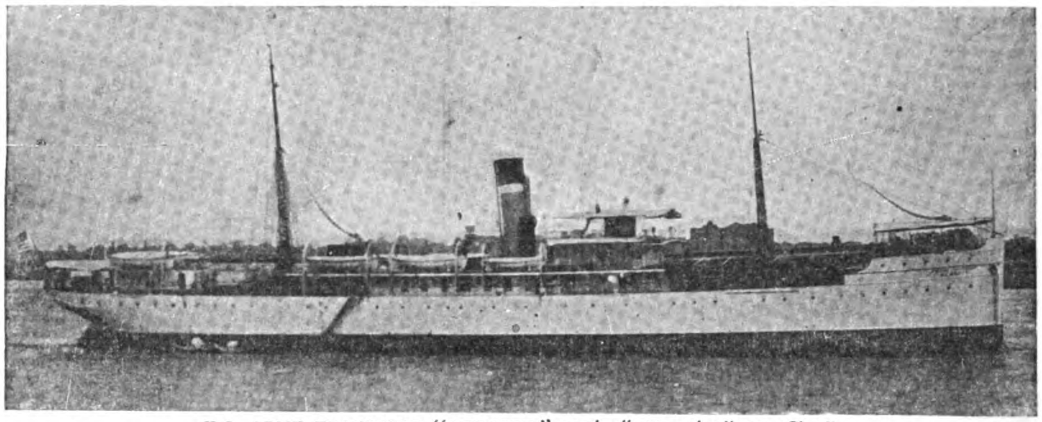
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″

Cable Address "FARNHAM"
Codes Used, A.B.C. 4th, 5th & 6th Editions A-1, Watkin's, Scott's, Western Union, Bentley's and Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are four in number, ranging in length from 355 feet to 700 feet on the Blocks, and breadth of entrance from 53 feet to 80 feet, with a depth of water on the sill of from 16 feet to 27 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Low Pressure Hot Water and Steam Heating Installations

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR
"F.B." INTERNATIONAL CODE

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

ENQUIRIES SOLICITED

Light railway lines are laid throughout workshops and yards.

A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

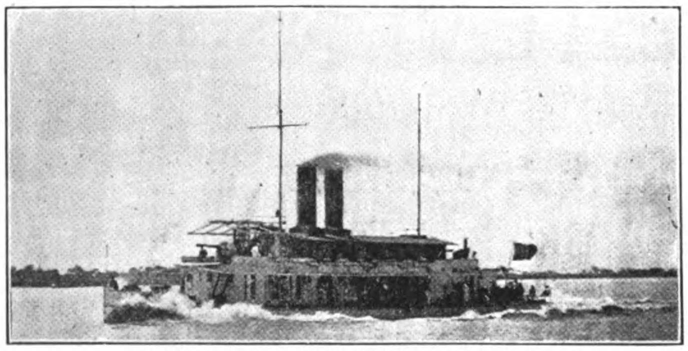
Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

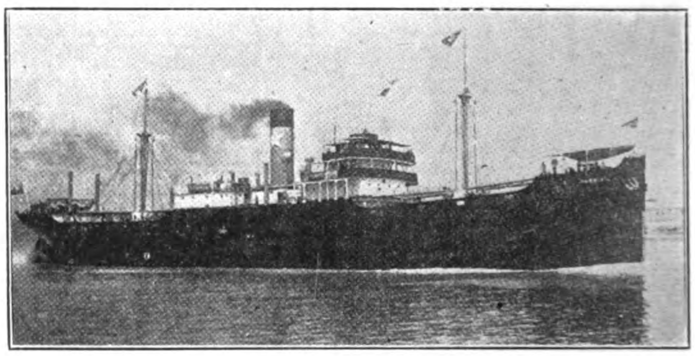
Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

PARTICULARS OF DRY DOCKS

Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock ...	700 feet	80 feet	27 feet
International Dock ...	528 ,,	77 ,,	23 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,



H.I.M.S- "ERMANNO CARLOTTO"
Designed and Constructed for the Royal Italian Navy
Length 160 feet. Twin Screw Engines.
Draft 2 feet 10 inches with full equipment and 30 tons of coal on board. Mean continuous speed 14 knots per hour.



s.s. "YANNIS" ex "WAR TIARA"
Sister Ship s.s. "PANAGIS" ex "WAR DIADEM"
Sister Ship s.s. "MELLON" ex "WAR REGALIA"
Built for the British Government.

View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

Head Office: **Nagasumi-cho :: *Warehouse Office:* Midori-cho**

Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
"DOCK"
Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:

No. 1	625′ × 80′ × 28′
No. 2	380′ × 50′ × 26′
No. 3	480′ × 63′ × 21½′

SHIPBUILDING BERTHS:

No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4 } No. 5 }	680′ × 38′

WAREHOUSES:	TSUBO.
Iron Building	8,871.57
Concrete Building	1,636.99
Brick Building	2,011.72
Others	5,807.74

Directors: TOSHINOBU SUDA, Esq. *(Chairman),* MANKICHI MIYANAGA, Esq. *(Managing Business Dept.),* TAMATARO TOJO, Esq. *(Managing Shop Dept.)*

Agencies: NIPPON YUSEN KAISHA, London Branch. NIPPON YUSEN KAISHA, New York Branch.

All situated in Yokohama Harbour, the First Port at which Trans-Pacific Steamships arrive, and the Last Port from which they depart.

Complete Facilities for every Work and Fully Equipped up to date for

All Repairing Work. All Engine Work. All New Ship Work. All Boiler Work.

LIFTS

FOR ALL PURPOSES
FITTED WITH WORLD-FAMED VEE WHEEL DRIVE

MANUFACTURED BY

SMITH MAJOR & STEVENS LTD.

LONDON AND ABBEY WORKS, NORTHAMPTON
ENGLAND

EASTERN AGENTS:

CALCUTTA
MESSRS. JESSOP & CO., LTD.,
93 CLIVE STREET

SHANGHAI
MESSRS. SCOTT, HARDING & CO.,
6 PEKING ROAD

SINGAPORE
MESSRS. UNITED ENGINEERS, LTD.
5 BATTERY ROAD

EXCLUSIVELY USED BY BRITISH ADMIRALTY ON ALL LATEST BATTLESHIPS.

The New Engineering & Shipbuilding Works, Ltd.

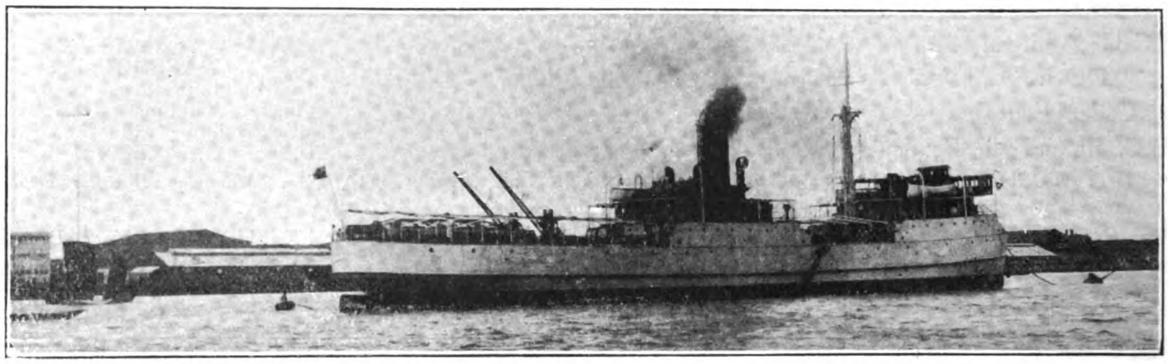
PROPRIETORS OF THE YANGTSZEPOO DOCK

Head Offices: 45 YANGTSZEPOO ROAD, Shanghai, China.

Call Flag: INTER. "A" CABLE ADDRESS: "SPEEDY"

SHIPBUILDERS AND REPAIRERS, MILLWRIGHTS, ENGINEERS, BOILERMAKERS, ELECTRICIANS, BLACKSMITHS AND FOUNDERS, SALVAGE EXPERTS, ELECTRIC AND OXY-ACETYLENE WELDERS. MANUFACTURERS OF THE "SPEEDY" MOTOR. MAKERS OF STURROCK'S PATENT FURNACE BRIDGES. MAKERS OF STEEL WINDOW CASEMENTS AND STRUCTURAL STEEL FOR BUILDINGS AND BRIDGES. MAKERS OF CARGO LIFTS.

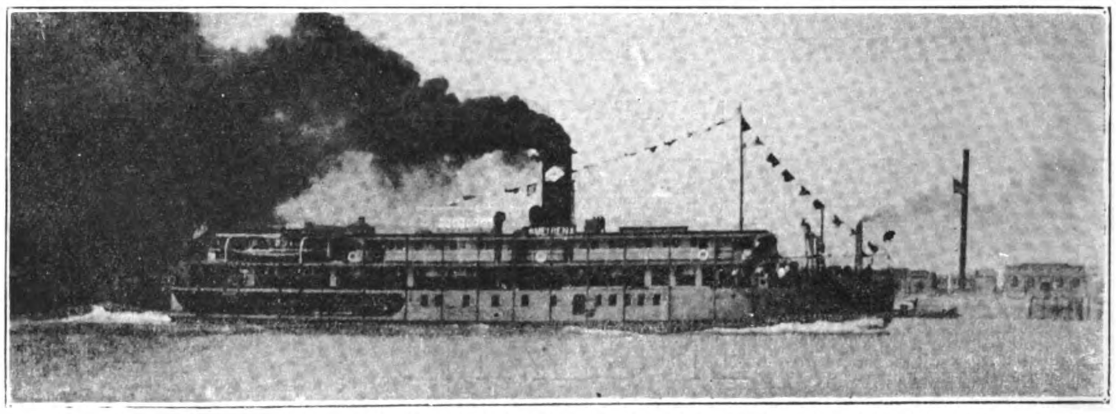
SOLE REPRESENTATIVES FOR KITCHEN'S REVERSING RUDDERS



300-ft. Steel Twin Screw River Steamer Built and Engined by the New Engineering & Shipbuilding Works, Ltd.

Vessels Docked or Placed on Slip at Short Notice

ESTIMATES, DESIGNS AND SPECIFICATIONS, PREPARED FREE OF COST FOR THE CONSTRUCTION OF ALL CLASSES OF ENGINES AND BOILERS, CONDENSING PLANTS, STEAMERS, TOW BOATS, LAUNCHES, PONTOONS AND LIGHTERS, WATER TANKS, WATER TOWERS, ELECTRIC POWER AND LIGHT INSTALLATIONS.



200-feet Upper Yangtsze Steamer Built and Engined at the New Engineering & Shipbuilding Works, Ltd.

Repairs and Overhauls Effected Promptly, Efficiently and Expeditiously
Under Foreign Supervision at Moderate Charges.

SPECIAL STAFF FOR ATTENDING TO REPAIRS AT MILLS AND FILATURES.

Cable Address:
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO.,
LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

DAIREN, N.-C.,
Dockyard & Engineering Works

HYOGO, KOBE
Steel Foundry, Bar Mill and Railway Shops

FUKIAI, KOBE
Plate Mill

BUILDERS OF

BATTLESHIPS, CRUISERS, TORPEDO-BOATS, DESTROYERS, SUBMARINES

ALSO, BUILDERS OF

FIRST-CLASS HIGH-SPEED OCEAN STEAMERS OF THE LARGEST SIZE AND POWER

CREOSOTED TIES

OF

PHILIPPINE TIMBER

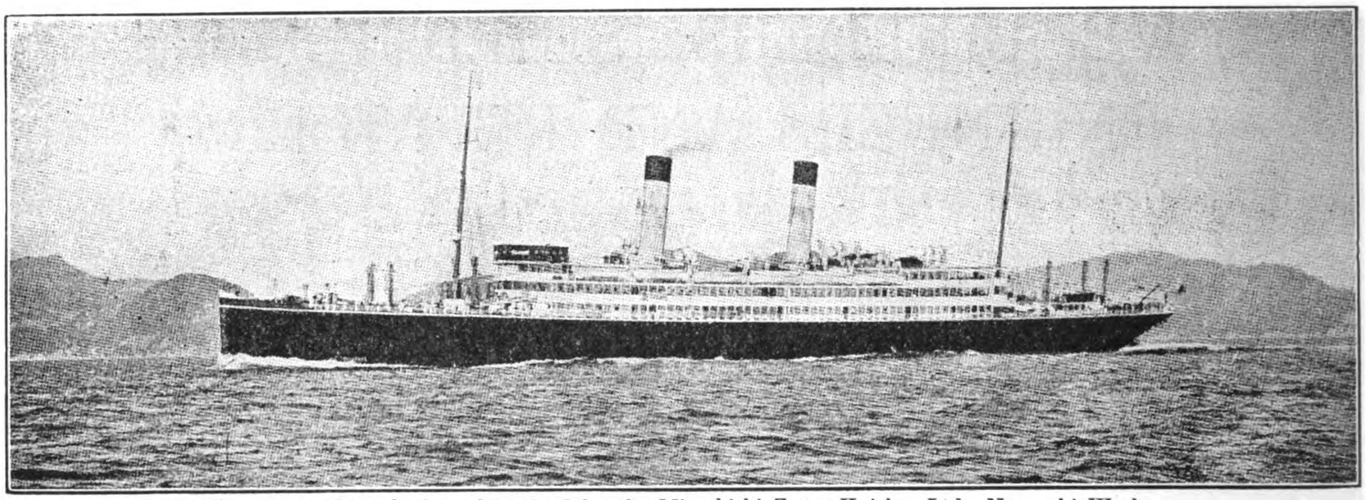
FOR

RAILROADS

ATLANTIC, GULF & PACIFIC CO. OF MANILA

77 Muelle de la Industria Manila, P.I.

Cable Address: "DREDGING"



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

DOCK No. 1			DOCK No. 2			DOCK No. 3		
Extreme Length	523	Ft.	Extreme Length	371	Ft.	Extreme Length	728.9	Ft.
Length on Blocks	513	,,	Length on Blocks	350	,,	Length on Blocks	714	,,
Width of Entrance on Top	89	,,	Width of Entrance on Top	66	,,	Width of Entrance on Top	99½	,,
,, ,, ,, ,, Bottom	77	,,	,, ,, ,, ,, Bottom	53	,,	,, ,, ,, ,, Bottom	88½	,,
Water on Blocks at Spring Tide	26½	,,	Water on Blocks at Spring Tide	24	,,	Water on Blocks at Spring Tide	34½	,,

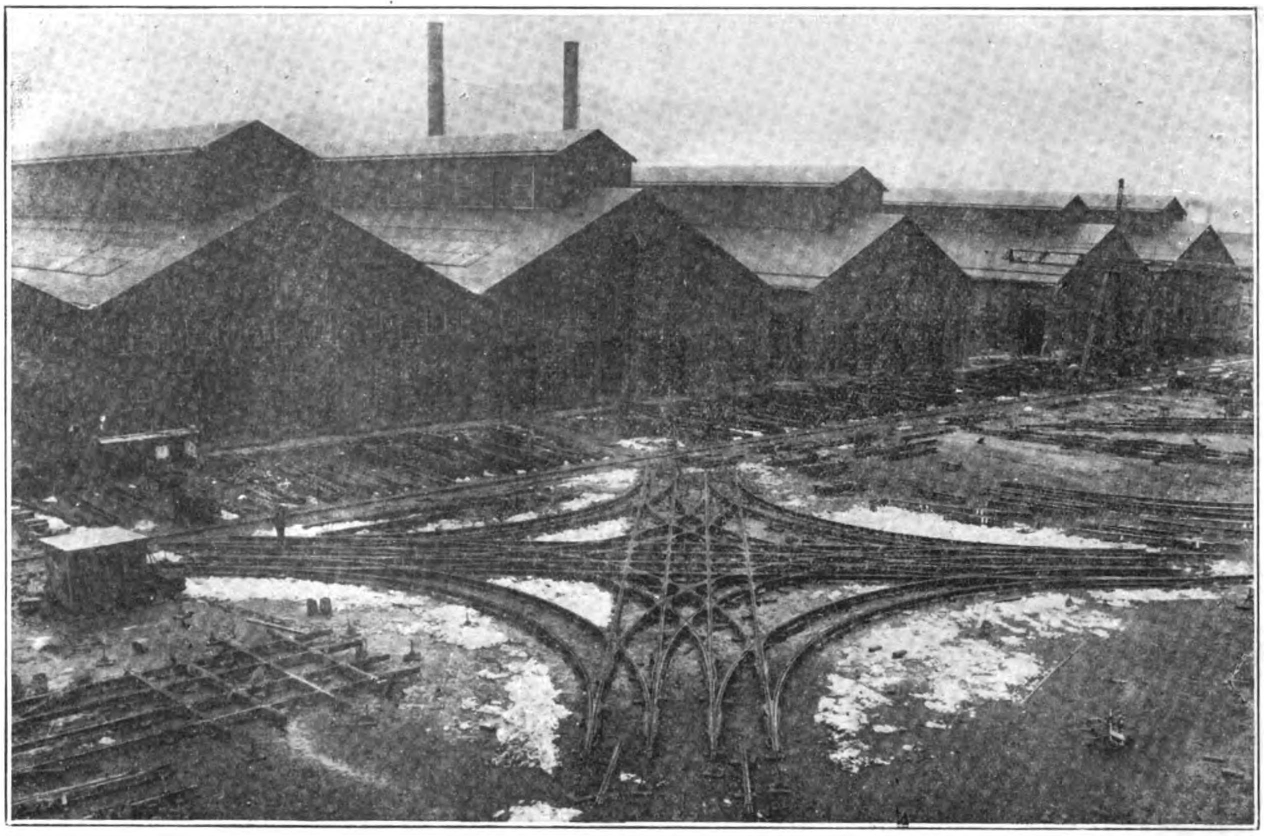
THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
Also Electrical Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND

LORAIN

Special Track Work



The Standard Tramway Construction Throughout the World

UNITED STATES STEEL PRODUCTS CO.

UNION BUILDING
THE BUND AND CANTON ROAD
SHANGHAI
CHINA

15 NAKADORI MARUNOUCHI
TOKYO, JAPAN

22 WU LIANG TA JEN HUTUNG
PEKING, CHINA

MITSUBISHI IRON AND STEEL CO., TD.

(MITSUBISHI SEITETSU KAISHA, LTD.)

HEAD OFFICE: MARUNOUCHI, TOKYO

CAPITAL: (PAID UP) YEN 30,000,000

MILL (LLOYD'S APPROVED) KENJIHO, CHOSEN (KOREA)

PRODUCTS PIG IRON—Basic & Foundry 100,000 tons.

STEEL—High Tensile & Mild Steel 50,000 tons.

BY-PRODUCTS—Sulphate of Ammonia; Pitch; Naphthalene; Tar Oil (light, middle, heavy); Slag-Cement, Slag Wool.

Sales Agents: The Mitsubishi Trading Company, Limited

BRANCHES AND AGENCIES: Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

MITSUBISHI MARINE & FIRE INSURANCE Co., Ltd.

MITSUBISHI KAIJO KASAI HOKEN K. KAISHA

Head Office:

MARUNOUCHI, TOKYO

SUBSCRIBED CAPITAL - - Yen 5,000.000
PAID-UP CAPITAL - - - „ 1,250.000

Branches and Agencies:

LONDON, NEW YORK, OSAKA, KOBE, SHANGHAI, AND OTHER IMPORTANT CITIES AND PORTS IN THE WORLD

MITSUBISHI WAREHOUSE CO., LD.

(MITSUBISHI SOKO KAISHA, LTD.)

LANDING, SHIPPING AND FORWARDING AGENTS, STEVEDORES, CUSTOMS BROKERS & WAREHOUSEMEN

Head Office: MARUNOUCHI, TOKYO

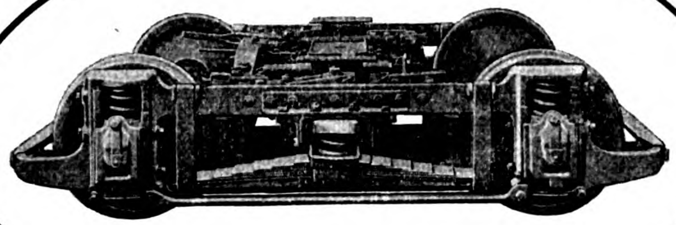
Branches: TOKYO, YOKOHAMA, KOBE, OSAKA AND MOJI

General Managers of the

KYODO UNYU KAISHA

YOKOHAMA

3 KAIGAN-DORI, ITCHOME
YOKOHAMA
WITH TWO BRANCHES IN TOKYO



No. 77-E Truck
24 or 26-in. Wheels

For
Low-Level Cars

Main Office and Works: PHILADELPHIA, U.S.A.

THE J. G. BRILL COMPANY

Builders and Exporters

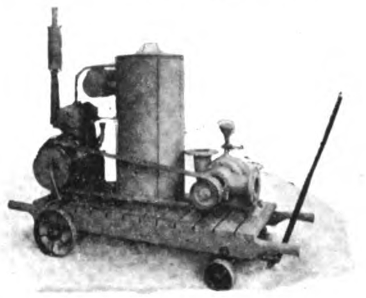
ELECTRIC TRAMCARS AND TRUCKS

Far East Representative:
ANDERSEN, MEYER & CO., LTD., SHANGHAI

SULZER BROTHERS

SHANGHAI ENGINEERING OFFICE
No. 4 AVE. EDWARD VII

蘇爾壽
工業事務所
上海愛多亞路四號



Portable Centrifugal Pump driven by Gasoline Motor

Uniflow Steam Engines, Upright Watertube Boilers, High and Lowlift Centrifugal Pumps, Fans and Ventilators for all purposes, FIRE ENGINES, Stationary Diesel Engines, Direct Reversible Diesel Marine Engines, Ice and Refrigerating Plants, Central Heating, Electro-Boilers, Maag Gear Machines.

目錄及關於工業上之問答等請直接本公司惟
須指明經何進口行以便公司與之接洽一切也

WINTERTHUR. SWITZERLAND.

Through America

via

The Milwaukee Railway

(*The Puget Sound Electric Route*)

A short, quick, and most comfortable route across the American Continent over the

World's Longest Electrified Railroad

For 649 miles over four mountain ranges mighty electric locomotives, using "White Coal" for power haul the splendidly equipped all-steel transcontinental trains

"The Olympian"* and *"The Columbian"

from Seattle and Tacoma daily for Spokane, Butte, Minneapolis, St. Paul, Milwaukee and Chicago.

"The Pacific Limited"

from San Francisco to Chicago via Southern Pacific, Union Pacific and Milwaukee Railways.

At Chicago connections are made with fast express trains for the Atlantic Seaboard and all points east.

Rail orders and full information respecting train schedules, connections, fares, etc., on application to your steamship agent or at any office of Thos. Cook & Son in the Orient.

For sleeping car reservations, write, cable or wireless any of the following representatives of the

Chicago, Milwaukee & St. Paul Railway

Cable Address: "Milwaukee"

Seattle—J. F. Bahl, City Passenger Agent, 2nd and Madison
San Francisco—C. H. Miles, General Agent Passenger Dept., 995 Monadnock Bldg.
Vancouver—Geo. W. Hibbard, General Agent, 626 Hastings St., West
Victoria—F. O. Finn, General Agent, 902 Government St.
A. P. Chapman, Jr., Ass't Gen'l Passenger Agt., 663 Stuart Bldg., Seattle
Geo. B. Haynes, General Passenger Agent, Chicago

TOSHIN SOKO

KABUSHIKI KAISHA

WAREHOUSING, FORWARDING AND EXPRESS CO.

WAREHOUSEMEN LANDING AND SHIPPING

STEVEDORES CUSTOM BROKERS

WAREHOUSING AREA - - - - - - - - - 76,000 tsubo (308,000 Sq. yds.)
VALUE OF GOODS IN WAREHOUSE (latest date) - - - - Yen 95,000,000
CAPITAL (PAID UP) - Yen 5,000,000; RESERVE FUND - Yen 4,768,000

President: BARON TOSHITARO MITSUI
Managing Directors: H. OKUMURA and R. KADONO
Directors: K. HAYASHI and K. FUKUI
Auditors: E. KOSHI and T. MAJIMA

HEAD OFFICE: No. 5 HONKAWAYA-CHO, NIHONBASHI-KU, TOKYO

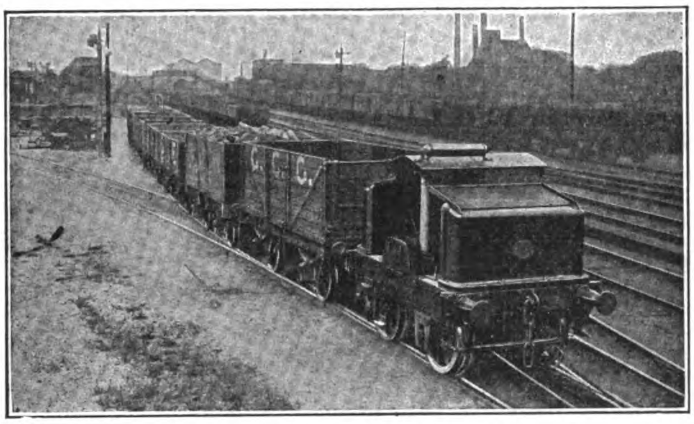
BRANCHES and SUB-BRANCHES:

TOKYO—Hakozaki-cho, Fukagawa-ku
OSAKA—Nakanoshima, Nishi, Utsubo, Aji-kawa, Nishinari, Sakurashima Chikuko
YOKOHAMA—Shinko-cho
NAGOYA
KOBE—Kano-cho
MOJI—Hama-cho
SHIMONOSEKI—Kannonzaki-cho

MOTOR RAIL & TRAM CAR CO., LTD.

LIGHT RAILWAY ENGINEERS

Manufacturers of Internal Combustion Engined Locomotives, Rail-Inspection and Tramcars



40 H.P. Loco Working on Main Line Siding

These vehicles are thoroughly reliable, economical, inexpensive to maintain, easily handled and entail no stand-by losses

All kinds of Light Railway Material supplied

ENQUIRIES SOLICITED

WORKS & OFFICES:
Telegrams & Cables: Motral-Bedford
Codes: A.B.C. Engineering 5th Ed & Bentleys

SIMPLEX WORKS:
Bedford, England

CIGARETTE MACHINERY

800 Cigarettes per Minute!

PLAIN OR TIPPED ON

Our New "Triumph-Model U.G." Cigarette Machine

The phenomenal speed of this machine, its supreme simplicity and its low cost of upkeep, are due to the revolutionary improvements in its design and construction—the outcome of 40 years of experience in the manufacture of cigarette machinery.

This machine is an indispensable part of the equipment of any modern up-to-date factory. Old modern machines are rapidly being replaced. The measure of your success depends on your cost of production.

Write for full particulars to-day on our—

CIGARETTE MACHINES
TOBACCO STEMMING MACHINES
AUTOMATIC KNIFE GRINDERS
CIGARETTE PACKING MACHINES

UNITED CIGARETTE MACHINE CO., Inc.,
Lynchburg, Va., U.S.A.

Agents for China: AMERICAN TRADING CO.
Robert Dollar Building, SHANGHAI

SHANGHAI TO SEATTLE 16 DAYS

A New Fast American
TRANS-PACIFIC SERVICE
between MANILA-HONGKONG
SHANGHAI
KOBE-YOKOHAMA
and PUGET SOUND
VICTORIA, B.C.—SEATTLE, WASH.
VIA THE SHORT ROUTE
UNITED STATES SHIPPING BOARD 535's

	Leaving Shanghai		Arr. Seattle	
President McKinley	Dec.	3	Dec.	19
„ Jackson	Dec.	17	Jan.	2
„ Grant	Dec.	31	Jan.	16
„ Jefferson	Jan.	14	Jan.	30
„ Madison	Jan.	28	Feb.	13

AGENTS

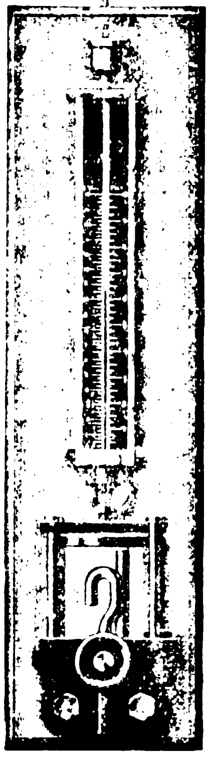
Manila: No. 24 Calle David, P.O. Box 1636
Hongkong: No. 4 Des Voeux Road.
Shanghai: No. 29-B Nanking Road, Amer. P.O. Box 503
Kobe: No. 7-A Kaigan-Dori. P.O.Box 308
Yokohama: No. 75-A Main Street, P.O. Box 326
Singapore: No. 2 Prince Street.

HEADQUARTERS FOR THE FAR EAST
No. 29-B Nanking Road, Shanghai.
Major GEO. A. HEYBURN, Manager.
GEO. J. McCARTHY, Assistant General Passenger Agent.

The ADMIRAL LINE

ANYWHERE ON THE PACIFIC

ADMIRAL ORIENTAL LINE



Bonlow

PATENT

AUTOMATIC TANK GAUGE

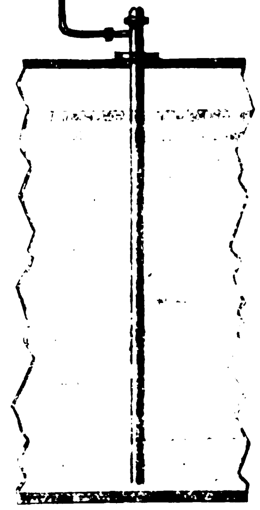
For all Types of Tanks on Board Ship and Land. Easy to Install. Easy to Read.

Can be installed at any distance from Tanks.

No complicated bell in tank, only a straight pipe which can be easily cleaned without opening tank.

The Gauge is self-checking, which ensures accurate Readings.

Full particulars and catalogue gladly sent on request to the Sole Makers:



Archibald Low & Sons, Limited,

Merkland Works, Partick, Glasgow, Scotland

Telegrams: "Highlow, Glasgow" Code: A.B.C.

London Show Rooms: J. H. T. PETERSEN (ENGINEERS MERCHANTS), LTD., 59 Shoe Lane, E.C.4.

DIAMOND

POWER SPECIALTY CORPORATION

Exclusive Manufacturers in the United States of

DIAMOND

SOOT BLOWERS

For all high-pressure steam boilers.

10340 Oakland Avenue,
DETROIT, MICHIGAN, U.S.A.

CYCLONE PLENUM HEATING AND VENTILATING

A Famous "Cyclone" System for providing an even and continuous distribution of warmth, together with ventilation of the highest efficiency, in workshop and factory. This plant stands supreme throughout the world. It improves working conditions, and therefore has a great effect upon the employees and the quality and quantity of work done.

This apparatus is adaptable to any purpose.

Write Now for Booklet No. 391

MATTHEWS & YATES LTD.

Cyclone Works, Swinton
Nr. Manchester, England

TOYO KISEN KAISHA

SEMI—TROPIC TRANS—PACIFIC SERVICE

N. A. LINE

HONGKONG
MANILA TO
SAN FRANCISCO
via
HONOLULU

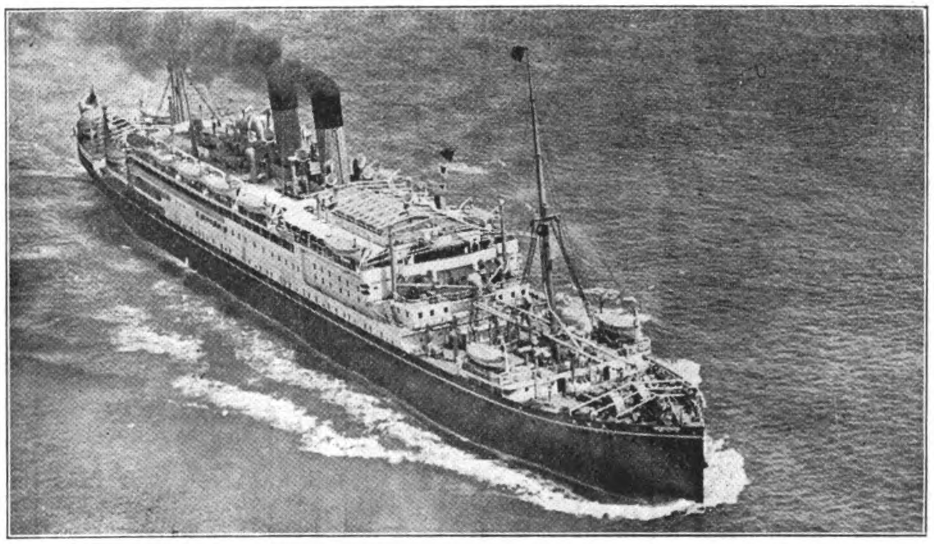
TAIYO MARU
22,000 Tons

TENYO MARU
22,000 Tons

SHINYO MARU
22,000 Tons

KOREA MARU
20,000 Tons

SIBERIA MARU
20,000 Tons



S. A. LINE

Between Hongkong, Japan Ports, Honolulu, San Francisco, West Coast Ports of Mexico, Balboa, Callao, Iquique and Valparaiso

ANYO MARU
18,700 Tons

SEIYO MARU
14,000 Tons

RAKUYO MARU
18,500 Tons

GINYO MARU
16,000 Tons

JAPAN, CHINA JAVA LINE

S.S. PERSIA MARU
9,000 Tons

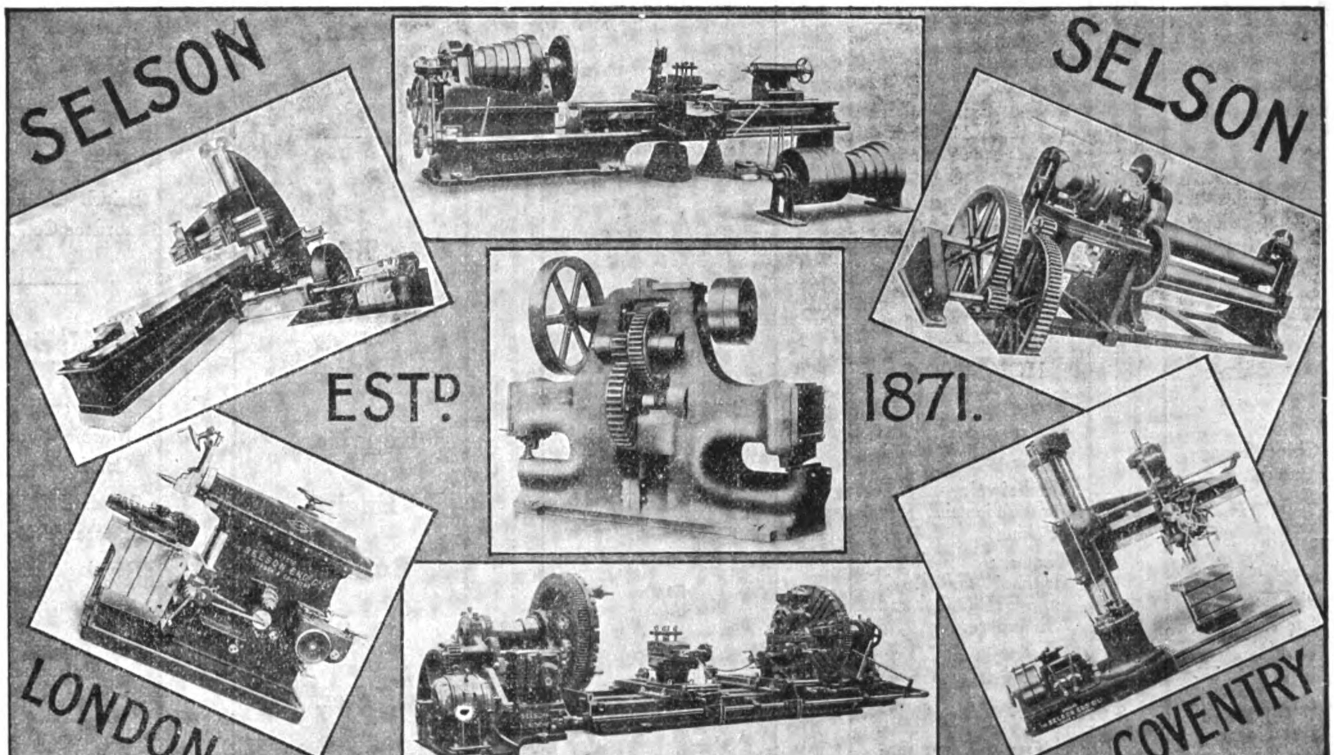
PERFECT SERVICE—UNEQUALLED CUISINE

Sailings from Shanghai

S.S. "SIBERIA MARU" sails for San F'cisco .. .. Dec. 11, 1922
S.S. "TENYO MARU" " " " " .. .. Dec. 22, 1922
S.S. "KOREA MARU" sails for San F'cisco .. .. Jan. 8, 1923
S.S. "SHINYO MARU" " " " " .. .. Jan. 19, 1923

HEAD OFFICE TOKYO JAPAN
GENERAL OFFICE YOKOHAMA

Branches: Hongkong: King's Building; Shanghai: 71 Szechuen Road; Manila: Chaco Building; Kobe: 7 Bund
Agencies: At all Ports of call and in all the Principal Cities of the World



83 & 85 Queen Victoria Street, London, E.C. 4 Cable Address "SELONEER" London

Amoy
Antung
Canton
Changsha
Chefoo
Chinkiang
Dairen (Dalny)
Foochow
Hankow
Harbin
Hongkong

BUTTERFIELD & SWIRE

(JOHN SWIRE & SONS, LTD.),
FRENCH BUND, SHANGHAI
Telephone No. Central 4881
AGENTS FOR

Ichang
Kiukiang
Kobe
Nanking
Newchwang
Ningpo
Shanghai
Swatow
Tientsin
Tsingtau
Wuhu
Yokohama

The Blue Funnel Line

(Ocean S.S. Co., Ltd. & China Mutual S. N. Co., Ltd.)

Fast Services

Japan, China, Hongkong, Philippines. Straits and Java to Europe via Suez Canal and to New York via Suez and Panama Canals also

Trans-Pacific between Oriental ports and West Coast of N. America.

CHINA NAVIGATION CO., LTD.

Passenger and Freight Steamship Services

SHANGHAI TO, AND FROM,

Weihaiwei, Chefoo and Tientsin (for Peking); Newchwang: Antung.

Hankow, Ichang (with connection to Chungking), Changsha, and Intermediate Yangtsze Ports.

Hongkong and Canton; Amoy and Swatow; Ningpo; and General Coasting Services.

HONGKONG TO, AND FROM,

Manila, Cebu, and Iloilo

Weihaiwei, Chefoo and Tientsin (for Peking)

Canton; Hoihow, Pakhoi and Haiphong; Bangkok and Singapore.

Shanghai and Yangtze Ports (as above)

Sydney, Melbourne and Australian Ports (Australian-Oriental Line)

Taikoo Sugar Refining Co., Ltd.

FINEST CANE SUGARS

Taikoo Dockyard & Engineering Company of Hongkong Ltd.

Ship Builders, Ship Repairers, Engine Builders, Boiler Makers, etc.

Fire and Marine Insurance

Fire

London and Lancashire Insurance Co., Ltd.

Royal Exchange Assurance Corporation.

Guardian Assurance Co., Ltd.

Orient Insurance Company.

British Traders Insurance Co., Ltd.

Marine

British and Foreign Marine Insurance Co., Ltd.

Standard Marine Insurance Co., Ltd

Royal Exchange Assurance Corporation.

Sea Insurance Co., Ltd.

Guardian Assurance Co., Ltd.

KOKUSAI KISEN KAISHA

Nominal Capital - -	Yen 100,000,000.00
Paid-up Capital - -	„ 87,500,000.00
Aggregate Tonnage - -	500,000 Tons

FLEET OF STEAMSHIPS

Name	Tons D.W.	Name	Tons D.W.
Rozan-Maru	8,700	Seifuku-Maru	9,100
Vancouver-Maru	9,100	Suez-Maru	6,600
Boston-Maru	8,800	Daio-Maru	9,000
Tofuku-Maru	9,100	Kashu-Maru	8,800
Chifuku-Maru	9,100	No. 2 Kifunesan-Maru	5,000
Ryufuku-Maru	9,100	Yousan-Maru	5,000
Hankow-Maru	6,400	Taisan-Maru	5,000
Yoni-Maru	11,000	Yuri-Maru	11,000
Taibu-Maru	8,900	Texas-Maru	11,000
San Francisco-Maru	9,100	Tamatsu-Maru	6,600
Naple-Maru	9,100	Eifuku-Maru	9,100
Glasgow-Maru	9,100	Kifuku-Maru	9,100
Yayoi-Maru	8,700	Toyofuku-Maru	9,000
Yaye-Maru	11,000	Raifuku-Maru	9,100
Malta-Maru	8,700	Keifuku-Maru	9,100
Buyo-Maru	8,800	Washington-Maru	9,100
Brazil-Maru	9,100	Tokufuku-Maru	9,100
Kofuku-Maru	9,100	Portland-Maru	9,100
Yezari-Maru	6,900	England-Maru	9,100
Yugao-Maru	5,000	Chili-Maru	9,100
Yubaye-Maru	5,000	Argentine-Maru	9,100
Sydney-Maru	6,400	Port Said-Maru	9,100
Shanghai-Maru	6,400	New York-Maru	9,100
Singapore-Maru	9,100	Karorin-Maru	6,400
Jyufuku-Maru	9,100	Tasmania-Maru	6,400
Hiyeizan-Maru	6,700		

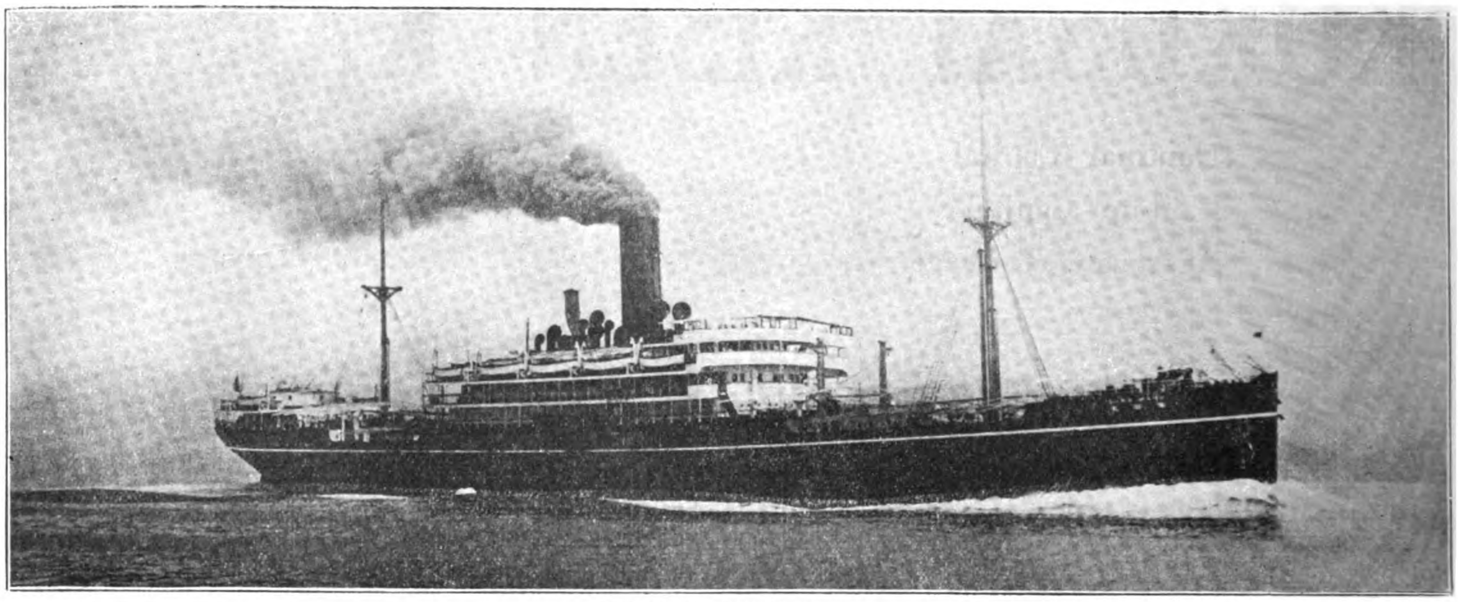
Head Office: No. 8 Kaigan-dori, Kobe

BRANCH OFFICE:

Tokyo Kaijo Building, Maruno-uchi, Tokyo, Japan

NIPPON YUSEN KAISHA

HEAD OFFICE TOKYO, JAPAN



"SUWA MARU"

OVER THE

THE PALATIAL STEAMERS OF THE N.Y.K.

WILL CARRY YOU IN COMFORT, CLEANLINESS AND WITH COURTESY

PRINCIPAL SERVICES

EUROPEAN LINE (Fortnightly)

WEST COAST LINE (Monthly).
GLASGOW, BIRKENHEAD, AND SWANSEA (occasionally).
SINGAPORE, HONGKONG, SHANGHAI AND JAPAN.

NORTH CONTINENTAL LINE (Monthly).
HAMBURG, GRANGEMOUTH, ROTTERDAM AND ANTWERP.
STRAITS, JAVA, CHINA AND JAPAN.

NORTH AMERICAN LINE (Every 3 Weeks).
HONGKONG, MANILA, SHANGHAI, KOBE AND YOKOHAMA.
VICTORIA, B.C., AND SEATTLE.

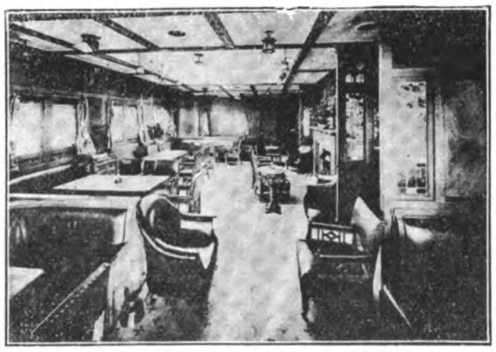
SOUTH AMERICAN LINE (Every 2 Months)
KOBE, SINGAPORE, DURBAN AND CAPETOWN.
SANTOS, RIO DE JANEIRO AND BUENOS AIRES.

AUSTRALIAN LINE (Monthly).
YOKOHAMA, KOBE, HONGKONG, MANILA, ZAMBOANGA, THURSDAY ISLAND, TOWNSVILLE, BRISBANE, SYDNEY AND MELBOURNE.

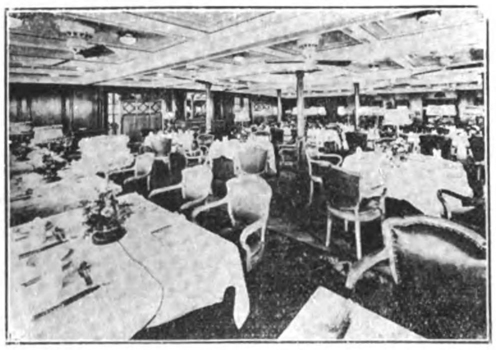
BOMBAY LINE (Fortnightly).
KOBE, SHANGHAI, HONGKONG, SINGAPORE, MALACCA, COLOMBO, TUTICORIN AND BOMBAY.

CALCUTTA LINE
(FORTNIGHTLY) YOKOHAMA, KOBE, HONGKONG, SINGAPORE PENANG, RANGOON AND CALCUTTA.
(MONTHLY) CALCUTTA, MADRAS, COLOMBO, SUEZ, PORT SAID, ALGIERS AND NEW YORK.

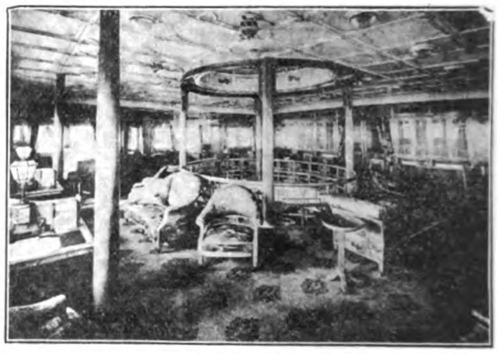
NEW YORK-FAR EAST LINE (Fortnightly)
KOBE, YOKOHAMA, SAN FRANCISCO, PANAMA, COLON, HAVANA AND NEW YORK.
NEW YORK TO JAPAN, CHINA AND PHILIPPINES.



Smoking Room



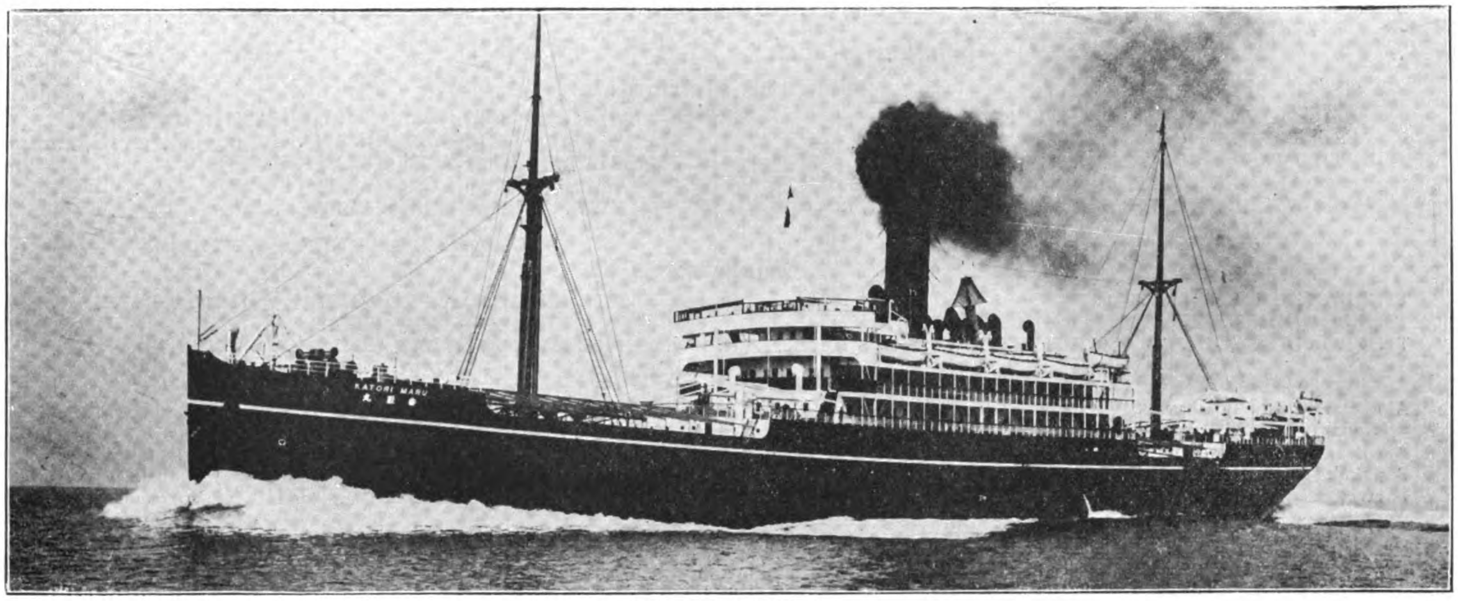
Dining Saloon



Social Hall

NIPPON YUSEN KAISHA

FLEET: 114 STEAMERS, 574,594 GROSS TONS



"KATORI MARU"

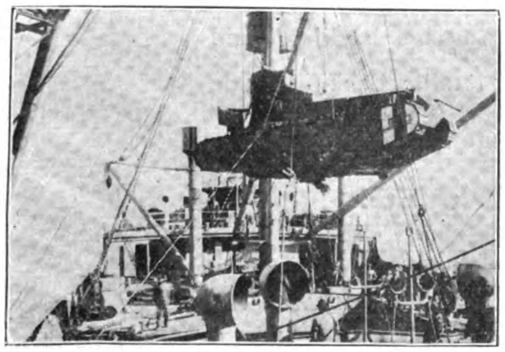
SEVEN SEAS

SHIPPERS WILL FIND QUICK DISPATCH, WITH WHARF, WAREHOUSE AND TERMINAL FACILITIES AT ALL PRINCIPAL PORTS SERVED BY N.Y.K. STEAMERS

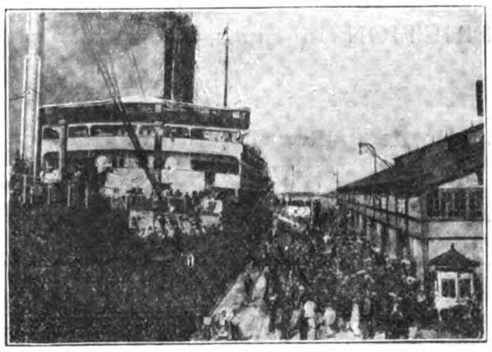
PRINCIPAL BRANCHES AND AGENCIES

Yokohama	Tokio	Nagoya	Keelung
Kobe	Moji	Nagasaki	Hankow
Hakodate	Otaru	Tientsin	Singapore
Tsingtao	Hongkong	Canton	Bombay
Penang	Colombo	Calcutta	Liverpool
Port Said	Marseilles	London	Chicago
Antwerp	Rotterdam	New York	Brisbane
Seattle	Manila	Townsville	Shanghai
Sydney	Melbourne	Osaka	

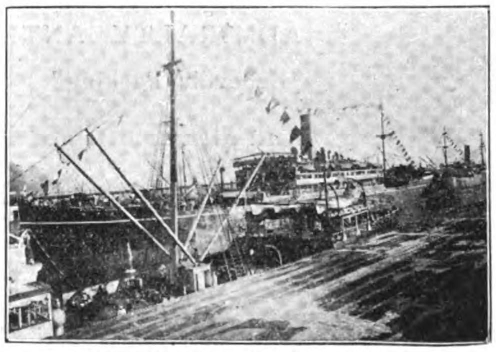
GIVE JAPANESE STEAMSHIPS THEIR SHARE OF YOUR JAPANESE CARRYING TRADE



Landing a Tank



Dock at Yokohama



Great Northern Dock at Seattle

Chartered Bank of India, Australia and China

INCORPORATED BY ROYAL CHARTER, 1853

Capital £3,000,000
Reserve Fund £3,700,000
Reserve Liabilities of Shareholders . £3,000,000

Head Office: 38 BISHOPSGATE, LONDON, E.C.
Shanghai Branch: 18 THE BUND.

Court of Directors:

SIR MONTAGU CORNISH TURNER, *Chairman.*
SIR DUNCAN CARMICHAEL
THOMAS CUTBERTSON, Esq.
SIR ALFRED DENT, K.C.M.G.
SIR WILLIAM HENRY NEVILLE GOSCHEN, K.B.E.
THE RIGHT HON. LORD GEORGE HAMILTON, G.C.S.I.
SIR JOHN NEWALL JORDAN, P.C., G.C.I.E., K.C.B., K.C.M.G.
WILLIAM FOOT MITCHELL, Esq.
JAMES MAXWELL GRANT PROPHIT, Esq.
LEWIS ALEXANDER WALLACE, Esq.

Chief Manager: W. E. PRESTON
Managers: J. S. BRUCE & G. MILLER

Bankers:

THE BANK OF ENGLAND.
THE LONDON JOINT CITY & MIDLAND BANK, LTD.
THE LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.
THE NATIONAL PROVINCIAL & UNION BANK OF ENGLAND, LTD.
THE NATIONAL BANK OF SCOTLAND, LTD.

Agencies and Branches:

Alor Star (Kedah)	Bombay	Colombo	Iloilo	Kuala-Lumpur (F.M.S.)	New York	Saigon	Taiping (F.M.S.)
Amritsar	Calcutta	Delhi	Ipoh	Madras	Peking	Seremban	Tavoy
Bangkok	Canton	Haiphong	Karachi	Manila	Penang	Shanghai	L. Burma
Batavia	Cawnpore	Hankow	Klang	Medan	Puket	Singapore	Tientsin
	Cebu	Hongkong	Kobe		Rangoon	Sourabaya	Yokohama

Drafts granted on the above Agencies and also on the principal Commercial Cities throughout the world. Bills of Exchange bought and received for collection. Travellers' Letters of Credit issued and every description of Banking and Exchange business undertaken.

C. J. SCOTT,
Manager

ATTWATER & SONS

MANUFACTURERS OF ALL KINDS OF

STEAM ENGINE and HYDRAULIC PACKINGS

PRESTON'S PERFECT PACKING The Best Self-setting Wedge Packing made

SILVERINE METALLIC For Acids and Superheated Steam

ADMIRALTY ANTI-FRICTION in Skins, known also as "Sausage Packing" and

"Belleville Packing" The Best Floating Metallic Packing made

And all varieties of Frictionless, Graphited and Greasy Packings, made from

ITALIAN HEMP, ASBESTOS, COTTON, Etc.

Hopwood Street Mills, PRESTON, Eng. ESTABLISHED 1868

Telegrams: "Attwaters, Preston" *Telephone No.:* 1045 (2 lines) *Codes:* 5th Edition A.B.C., and Western Union

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVIII SHANGHAI, DECEMBER, 1922 No. 12

FACING THE FACTS

From the September Issue of THE FAR EASTERN REVIEW

"If we wait another ten months or a year for the parliament to draft a constitution and Wu Pei-fu to settle his score with Chang Tso-lin, the control of China will have passed out of the hands of the *tuchuns* into those of the bandit chiefs. As the mandarins gave way to the militarists, the latter will give way to the bandit leaders. Over 40,000 so-called bandits are ravaging the province of Shensi, while the provinces of Honan, Anhuei and Shantung are overrun with these gentry, to say nothing of the chronic situation in Manchuria, where the Hunghutzes defy Chang Tso-lin to suppress them. In fact, nearly every province is overrun with these bands preying upon the helpless people. Towns are burnt and sacked, women torn from their homes, and men pressed into the service of the bands. Foreigners are siezed and held for ransom, and even the son of the redoubtable Christian General Feng was kidnapped from under his father's protecting wing on a recent trip to Kueiteh. The situation in Manchuria goes from bad to worse. Within the past few months several attempts have been made to interfere with the South Manchuria Railway, and recently the rail fastenings were loosened and the express wrecked. There is a limit to such practices. The forces of Wu Pei-fu, Chang Tso-lin and other military chieftains are helpless before the bandit rule. Any serious attempt to eradicate these bands only result in their augmentation by the desertion of the uniformed troops sent to suppress them. This is ANARCHY. This is CHINA. The foreign powers can prolong the situation and make matters worse by financing any one faction, they can advance sums to Peking in order that parliament, the "salary demanders union" and hordes of officials can be sure of their pay for ten months more, but at the present rate of progress, when that time expires, the white wolves of China will rule the country. The foreigner will again be asked to furnish the funds to restore order. A vicious circle. Stop it now."

THE "White Wolves" of China are slowly but surely overthrowing the last vestige of organized government and taking over control of the country. An orgy of rape, murder and destruction is now taking place in Central China. Cities, towns, villages and hamlets are looted, burned and razed to the ground; the fairest women carried off to slake the lust of the brigands. Merchants and officials are abducted and held for ransom. Foreigners are no longer exempt from capture and death, and as each crime goes unpunished the operations of the bandits become bolder and bolder, until now there is no security for life, liberty, honor or property for the foreigner who resides or travels through the provinces of Honan, Hunan, Anhwei and adjacent districts.

Where will it end? The legations in Peking seem powerless to find or suggest a solution. The policy of non-interference in the internal affairs of other countries is being scrupulously adhered to, and while the subjects of all nations cry out for protection their voices are drowned in the welter of sentimental propaganda which floods the newspapers of Europe and America. The Peking government is admittedly powerless to enforce law and order. Government has ceased to exist. Only the Waichiaopu and the loan-seeking officials of the ministry of finance provide evidence of any semblance of government in Peking. They are very active, so active in fact, that their activities overshadow the real events transpiring in the provinces.

The puppet show in Peking is unable to provide protection to life and property, in fact, it cannot even guarantee its own salaries. The masses of China are impotent before the hordes of militarists whose rabble armies are eating up their sustenance. The militarists in turn are now powerless before the increasing activities of the numerous bandit hordes, composed in large part of their own unpaid soldiers. As it is in Honan, right under the nose of General Wu Pei-fu, so it is in Hunan, in Anhwei, in Fukien, in Kwantung, in Kwangsi, in Szechuan, in Shensi, in Shantung and in the Three Eastern Provinces known as Manchuria.

For some years past, the apologists for crime and outlawry in Manchuria, Shantung and other parts of China, have succeeded in convincing the outside world that Japan was at the bottom of these disturbances. *There are no Japanese adventurers in Honan, Anhwei, Hunan or Szechuan.* There may be some in Manchuria, but banditry has been endemic in that section of China for a century

or more. Long before the Japanese set foot in Manchuria, it was an outlaw's paradise. The evidence of every traveler who explored the province before it was opened to trade corroborates this statement. When James and Younghusband traveled through the province in 1885 the bandits were as active as they are now, and ten years later when Hosie passed through on an official mission, his party was attacked. Hosie is authority for the statement that about a thousand bandits were beheaded yearly at the provincial capital of Kirin. *All this before the Japanese came into Manchuria.*

It has been the same in all other remote provinces of China. The home of piracy for centuries has been the China coast and the Canton delta, while the frontiers of Indo-China have provided hair-raising episodes that put in the shade all the diabolical deeds of outlawry in other countries.

The reports of the commissioners of customs for the Kwangsi and Kwangtung districts read more like 17th century tales of Captain Kidd than the prosaic recording of trade movements. When the bandit hordes in Manchuria and Shantung swoop down upon and loot and destroy towns and villages, there are always apologists to be found who hasten to ascribe their depredations to the machinations of the Japanese, but when the same gentry in Kwangsi, capture a French soldier, tie him to a table and skin him alive, the episode is passed over and forgotten. The truth must be faced that brigandage and outlawry in certain sections of China are endemic, the natural sequence to the failure of the authorities to enforce respect for the law. Now that government has ceased to exist in China, it is not at all surprising that the activities of these desperadoes are becoming bolder, and that for all practical purposes they are now the real rulers of the land. At the rate lawlessness is spreading in China, it will not be long before foreign settlements will be unsafe to live in, and unless measures are immediately adopted to insure protection, another six months will chronicle events that will call for international intervention.

The picture is not overdrawn, if anything it minimizes the situation. At various times when the Japanese government protested against the bandit activities in Manchuria and along the Korean border line, the foreign community in China has withheld sympathetic support, and when Japan, taking the law in her own hands, has despatched her troops into the disturbed districts, the howl of indignant protests re-echoed around the world. The shoe is now on the other foot. The orgy of rape, murder and destruction in Central China has at last provoked a forceful protest from the foreign residents of Hankow and the powers asked to intervene. This comes after a year of silent acquiescence on the part of the powers to the depredations of the bandits and military in the upper Yangtze and Central China districts. Travel on the Yangtze has been unsafe for over a year. Peaceful steamers with their freight of passengers have been fired upon; held up, robbed and otherwise interfered with. Now foreigners are dragged about the country as captives to the bandit hordes and placed on the firing line to ward off pursuit.

Space alone prevents us from reproducing in full the harrowing tales embraced in the speeches of protest against the bandit outrages at the meeting of the international chamber of commerce of Hankow held on November 15. This time the evidence comes largely from the missionaries, and it is to be hoped that their influence in Washington and London will compel that attention to the situation which could not be attained by commercial protests. In the words of the *Shanghai Times*, "*in any review of the brigand situation in Honan, brief though it be, it is impossible to enter into details and tell about the scores of bands which have been terrorizing nearly all parts of the province, devastating the country, burning and looting villages, market towns and even some cities, extorting money by torture, raping women and holding men and women for ransom. The details of this story would fill volumes. These bands are roving about the country, looting city after city, interfering with the flow of foreign trade, robbing mission stations, carrying off French, British and American nationals, among them even little children, dragging them from place to place, and even placing them upon the firing line, when as sometimes happens, there is an engagement between brigands and soldiers. One's blood boils on reading the terrible record of devastated territory, shameful indignities, burning towns and ravished women. And in face of all this, the authorities remain singularly apathetic and occasionally, prodded by diplomatic protests, are moved to send mild remonstrances to the tuchun of the province concerned.*"

Under the title of "Disorder in China, a Description of Conditions in some of the Chief Trading Areas of China," the November number of the British Chamber of Commerce *Journal* also places the facts before the reader.

It shows that, instead of the chief trading areas in China offering the rosiest prospects to the business man, they are really the happy hunting grounds of native robbers into which, if he ventures, he is more likely so lose what he has than to gain anything. The writer begins in the North and takes up the trading areas province by province. Of Manchuria he says: "Traveling has become unsafe off the principal main roads throughout the whole province. Many towns in the interior, which in previous years have been annually visited by the foreign travelers of the oil and tobacco firms, have been out of bounds this year." "In the Kirin province brigandage has been very bad, and little or nothing has been done by the provincial authorities to cope with it. Wulichieh, a very wealthy village only 20 miles from Kirin city, was attacked in the middle of September by a band who thoroughly looted the place killing in the process a large number of the inhabitants. This was only one of many similar outrages." Of Shantung it is said: "The Chiaotung circuit is still unsafe to travel and likely to remain so." In Shensi the story is: "Brigandage appears to be rife throughout the whole province, especially in the western districts. So many people have been kidnapped and held for ransom that the governor has sent his own family to Taiyuanfu in Shansi for safety." The story of Honan is given, but of that we have had more than enough of late. From Chungking the report comes that: "As a result of the recent military operations, brigandage has seriously increased. Towns and villages have been attacked and weathy residents held to ransom. Parts of the southeastern district are said to be practically depopulated, the rural population having sought refuge in the towns." From Chengtu the news is: "Brigandage is as rampant as ever. In parts of the province gangs of starving people have been raiding the houses of the rich. Cain Lung Chang, a small village only two miles outside the north gate of Chengtu, was completely cleaned out house by house."

In commenting on the above, the *Central China Post*, one of the best informed authorities on conditions in the interior, says "the above investigation was apparently not extended to such provinces as Hunan, Kiangsi, Fukien, Kwantung and Kwangsi, or the picture would have been blacker still. Such is China in the present year of grace: will the Home press please take note. It is indeed very wearisome, and rather annoying, to find China so frequently set up as an object of admiration that it is hard to have patience with it."

Unchecked lawlessness can have only one result. When cities within a few hours march of the headquarters of the redoubtable General Wu Pei-fu are sacked and ravished and no effort is made to round up the culprits, and when life is placed in jeopardy once the foreigner steps outside the Japanese railway zone in Manchuria and comes under the jurisdiction of the equally redoubtable Marshal Chang Tso-lin, and when travel becomes unsafe for foreigners in all other parts of China, we are rapidly approaching the time, when conscious of their immunity from chastisement, the Real Rulers of China, will extend the scope of their operations to the more opulent treaty ports.

I. MANCHURIA

The Powder Magazine

By Geo. Bronson Rea

"Kemal Pasha overthrew the treaty ef Sevres and defied the allies in Europe. It may be that Japan, to protect her vital interests, will be compelled to follow his example, in order to preserve the integrity of China and the peace of the Far East."

ENCOURAGED and supported by the Soviet and Germany, Kemal Pasha brought Europe face to face with the horrors of another upheaval in the Balkans. The firm stand of Great Britain alone checked the onward march of the victorious Turks and thwarted for the time being the designs of Moscow. The Turkish victory was hailed throughout Asia as a sign that Asiatics may yet come into their own through the dissentions of Europe. Checked for the moment in the Near East and true to traditional Muscovite tactics, the Soviet shifted the scene of operations to the next weakest point in Great Britain's armor, and is now creating a situation in Eastern Asia rapidly developing to the point where Japan will be called upon to take some decisive step in order to protect her vital interests against the progressive advance of Bolchevism into regions where their presence and influence can only result in complicating an already complex situation and precipitating a crisis. We cannot apply one principle in Europe and America for the protection of fundamental policies and deny the right of a strong power in Asia to apply the same principles where its very existence is at stake. If the British are upheld by world opinion in such firm measures for the defense of a basic strategic policy. and the United States is justified in applying the Monroe Doctrine, then the time is past when the world may condemn Japan for applying similar measures for the defense of her national existence,

Forced by the pressure of world opinion and united diplomatic action to recede step by step from advantageous strategic positions in Eastern Asia, until she can do so no further with dignity or safety, will military Japan emulate the example of Kemal Pasha? Or, if this comparison be distasteful, will a liberal Japanese cabinet follow the lead of its British counterpart and break the understandings which fetter its independent action in defending the existence of the empire? Will the consortium powers who have so emphatically laid down the fundamental law in regard to China's integrity, unite in support of the principles they established? Will they uphold the integrity of China? Will they send their troops into Manchuria to give effect to the doctrine that Mongolia is an integral and most important province of the republic of China? Will they demand in the name of world peace that China immediately put her house in order and comply with her international obligations by driving the Russians out of Mongolia, or, will they wait until Japan, like England, is compelled by the stern realities of the situation to adopt measures for the defense of policies which are as dear to her, if not dearer, than those which the world applauds when appealed to by Great Britain as justification for her recent stand at Constantinople, and those which every American, no matter what his creed, will fight at the drop of the hat to maintain?

Living up faithfully to her promises and pledges, Japan has returned Shantung to China, evacuated Siberia, withdrawn her forces from Hankow and northern Manchuria and reduced her garrisons in the southern part of the same province. She has fulfilled her agreement with the United States to clear out of Russian territory. Her government now faces the world with a clear conscience. The slate is wiped clean.

In the consortium negotiations which followed the Paris conference, certain very important principles were established. These negotiations centered upon the inclusion or exclusion of the Taonan-Jehol line into the international pool. Never perhaps in the history of diplomacy was such disregard given to the strategic policies of an ally by powers who would have fought to a finish before sacrificing similar doctrines evolved for their own defense. Never, perhaps, in the history of diplomacy has a friendly nation been so hard pushed as to be compelled to forsake the usages of diplomacy and explain her policies in language that left nothing the imagination. Japan's diplomats were finally forced to tell her allies that her claims to the Taonan-Jehol line were based primarily on strategic reasons for the mutual defense of China and Japan against "the menace from the direction of Urga." The powers, who have a very long memory where their own vital policies are concerned, were attacked with aphasia when asked to consider Japan's position. They forgot that the Taonan-Jehol railway rights were secured from China in 1912, immediately after Russia had taken over Mongolia and was moving heaven and earth to raise the loans in Paris to build the strategic railways that would enable her armies to attack Japan on her unprotected flank. The powers ignored the history of those terrible years following the peace of Portsmouth, when Japan was compelled to add to her staggering burden of taxation in order to arm and equip new battalions and keep abreast of Russia's gigantic plans and secret manœuvres to renew the conflict. This, Witte assures us, was to have occurred in 1912.

Japan's position in Eastern Asia differed in no wise from that of her allies in Europe, who forced through a difficult peace and broke up the German, Austrian, Russian and Turkish empires in order to create buffer states to guarantee them from the possible revenge of a vindictive enemy. These same powers, after carefully protecting themselves for the next quarter century, rejected the claims of Japan to erect similar defenses against the possible comeback of her traditional enemy. Principles that applied in Europe did not apply in Asia. The American and British press pooh poohed the idea of a reorganized Russia, when Japan put forward her reasons for maintaining certain policies in Eastern Asia. The same diplomats who calmly carved European Russia into new states for their own purposes, took over the self-imposed task of defending her integrity in Asia in order to check Japan. Japan could not be permitted to retain her rights to a strategic railway that would defend her from attack through Mongolia. After receiving assur-

ances, however, that her vital interests would never be placed in jeopardy through the activities of the consortium, Japan swallowed her disappointment and accepted the verdict which condemned her at no distant date to again stake her independence on the outcome of a trial of strength on the plains of Manchuria.

The concerted pressure of the powers upon Japan to compel her to relinquish the rights to a railway which constituted her first line of defense, will stand as one of the greatest in consistencies of recent history, the misguided move that is bound to bring its own reward. The very statesman, who as viceroy of India, declared that " the recognition by any power of Russia's right to a port on the Persian Gulf would be regarded as a deliberate insult to Great Britain, an intentional provocation to war," as secretary of state for foreign affairs in 1920, was the first to deny to Japan to right to apply a similar policy in Eastern Asia when the latter's national existence was placed in jeopardy through the forward moves of Russia. The American president who declined to permit the Monroe doctrine to be vitiated by the league of nations, rejected Japan's rights to maintain a policy calculated to ward off the attack of her most formidable enemy. It was a wonderful victory for western diplomacy. It is more wonderful still that Japan in order to preserve world peace, sacrificed her strategic position and accepted the doctrines laid down by her partners. As we scan the situation in Europe, we see no evidence that any other great power is willing to forego any of the advantages that has come to them as a result of the war. Japan stands alone, the one great military nation that has consented in the interests of world peace to surrender a vital policy.

At the Washington conference her position was again clearly set forth. Japan waived all claims to special rights in China, withdrew her twenty-one demands and whole-heartedly acquiesced in all proposals for the restoration of China's impaired sovereign rights. She made just one reservation. Japan declined to discuss or consider any proposition that might tend to weaken her position in South Manchuria. Even in this, it was with no intention of ignoring the sovereignty of China, or pushing forward aggressive designs. China was admittedly unable to guarantee her neutrality in these regions and with the ever present prospect of Russia returning once more to Harbin and Changchun, Japan had no option but to insist on the recognition of her position in Kwantung. Her position was identical with that set forth by Mr. Balfour in explanation of Great Britain's retention of the Kowloon territory, one purely strategical in its nature forced upon Great Britain because of China's weakness and inability to provide guarantees that a hostile army would not take possession of the Kowloon hills and bombard Hongkong from the land side. Japan stood firmly on the same argument, but with greater justification.

This was Japan's dead line in her concessions to China and world opinion. The Americans, British and French delegations fully understood Japan's unalterable termination to retain the strategic advantages gained as the result of the terrible sacrifice of 1905. In fact, it may be said that the Americans had full cognizance in advance of the Washington conference of Japan's emphatic refusal to consider or discuss any proposals which might in any way refer to her position in Manchuria. It was the recognition of this and Japan's similar acceptance of basic American policies which made the Washington conference possible. This understanding, we have reason to believe, was the direct outcome of General Wood's visit to Tokyo four months before the opening of the conference, when strong men sat opposite each other and indulged in a heart to heart talk. The gist of that frank discussion conveyed to the military leaders of Japan that any attempt on their part to fortify the chain of islands encircling the eastern Asiatic coast that might, under given circumstances, prevent access of American vessels to the Chinese markets, would be considered as sufficient justification for the United States going to war. On the other hand, the Japanese leaders conveyed in similar emphatic language to the American general that any attempt to interfere with their vital policies in Manchuria would reluctantly force Japan to fight. The irreducible minimum of each other's policies was frankly set forth and the way paved for the diplomats to discuss details and side issues at Washington. Japan would have rejected an invitation to any conference that embraced in its agenda a discussion of her position in Manchuria. This basic fact, recognized by the American leaders, made the Washington conference a success.

Japan has since lived up to her promises. She has relied upon the pledges of her partners in the consortium to respect her vital policies in Manchuria. She willingly consented to a limitation of armaments after the preliminary basic understanding with the United States was arrived at. In every way Japan has since endeavored to prove her pacific intentions. At every step she has receded, the Soviet has moved forward and taken her place. The powers have acquiesced in the Soviet occupation of Mongolia and pressure is now being exerted upon Japan to evacuate the northern half of Saghalien.

With Japan's power for defense undermined by treaties and understandings, the one obstruction to the rapid spread of Bolchevism in Eastern Asia has been removed. The powers, in a fit of jealousy, rejected the right of Japan and China to come together in a military alliance for the defense of their mutual interests in Mongolia and Manchuria and paved the way for the reds to re-enter Urga, extend their authority to Vladivostok and take over the Chinese Eastern Railway. A red force of ten thousand men now occupies Urga with at least 30,000 encamped somewhere in the vicinity of the Mongolian borders. Vladivostok has been handed over to Moscow. The Far Eastern republic has ceased to exist. The refugee whites, left to their fate, are swarming into Korea and Manchuria. The reds control the Siberian railway with their troops quartered at Pogranichnaya on the east and Manchuli on the west. It will not be long before they will take possession of the Chinese Eastern Railway and assume jurisdiction over the railway zone. We will return once more to the strategic situation existing in 1914, with Harbin as the Far Eastern military headquarters of the Russian army and confronting Japan at Changchun. With the red armies in Urga and strung along the Mongolian border lands and Japan hamstrung in the Taonan-Jehol zone, northern Manchuria will once more be lost to China. If Japan recedes one inch in south Manchuria the Soviet will take advantage of China's weakness and advance into the vacated position. This, therefore, is the situation, the world must face in the Far East. Once more the armies of Nippon will be watching the moves of Russia across the narrow strip which separates the northern and southern Manchuria military zones. The situation is loaded with dynamite with the fuses and red flags of danger in place waiting for the traditional humorist who doesn't know the thing is loaded, to playfully close the circuit.

Applying the Match

At this juncture, when the situation is becoming tense, when the Soviet is seeking to break the power of the allies in Europe and extend its influence in Asia, the Chinese seem determined to call upon Japan to evacuate the Kwantung leased territory in March of next year. At a time when China has disintegrated into several independent feudal states ; when its so-called central government exists in name only and by courtesy of the foreign powers ; when unpaid hordes of disbanded or deserting soldiery uniting with the always present bandit bands and pirate crews defy even the armies of the tuchun oligarchies and carry their depredations into treaty ports and attack foreign shipping ; with the treasury a tradition, almost a myth, the vaults empty and the government bankrupt, defaulting on its internal and foreign loans and current obligations ; with the salaries of officials months in arrears and the unpaid organized into salary demander's unions ; with the Soviet in Urga boldly annexing Mongolia and the red plenipotentiary telling the Chinese they are there to stay ; in the face of the most tremendous

crisis in Europe and Asia, powerless to enforce national rights or inspire respect, the Chinese minister of foreign affairs, backed by politicians playing to the gallery and encouraged by foreign advisers who have nothing to lose, selects this moment in which to re-open one of the most delicate questions in Far Eastern history, one, which, if answered according to their desires, would once more bring the Russians to the banks of the Yalu and force Japan to battle for her existence.

It would appear that the present is hardly the time to discuss the pros and cons of the validity of the Manchurian treaty signed as the outcome of the twenty-one demands, and it is certain that if the Chinese foreign office insists upon raising the issue and officially notifies the Japanese minister that the treaty has been declared null and void, a most serious situation will be created. From all present indications, Japan will refuse to disuss the matter. China will then have to take the next step, make good her stand, or be humiliated.

The annulation of a treaty under such circumstances must be supported by force. If China insists upon declaring the Manchurian treaty null and void and Japan refuses to discuss the matter, the situation so created will automatically cause a severance of diplomatic relations, and if a move is made by China to enforce her position, the fat will be in the fire.

China perhaps, has a sentimental case, but appealing as it is, Japan has a strong counter argument. In presenting her claims to the world, China must be prepared to go behind the twenty-one demands and explain her part in the secret diplomacy of 1895 which brought Russia into Manchuria and forced Japan into one of the most disastrous wars of history. China has justly complained of secret diplomacy where her own interests have been bartered away without her knowledge and Americans at least, have sympathized with her, but she must now face the facts in regard to the secret treaties and understandings which made her an ally of Russia, and under whose provisions Manchuria was converted into the base for Russia's attack upon Japan. As far as can be seen to date, China rests her case on the fact that the Manchurian treaty was extracted under compulsion as a result of the twenty-one demands. If the revelations of Sazanoff at the Paris peace conference and the confessions of Count Witte be ignored, China is in a very strong position, but if we accept the facts disclosed by these two Russian statesmen, China will have to explain her part in a secret alliance which forced Japan to make such terrible sacrifices in 1905. It may well be, that Japan, if forced, may also go behind the twenty-one demands and in the light of evidence which makes China an accessory to the war of 1905, demand compensation for the part she took in bringing about hostilities.

Chinese authorities declare, that the secret Li-Lobanoff alliance was vitiated in 1900 by the action of Russia, that China was not responsible for what happened after that date, but, on the other hand, there is public no record that the treaty was officially denounced, and it is also true, as far as Japan is concerned, that the damage was done previously to that date by handing over Manchuria and the Kwantung territory to Russia in compliance with the object and aims of the alliance. Japan, as yet, has never raised the question of China's part in bringing about the war with Russia. She fought the latter and restored to China her sovereignty over Manchuria, which the Russians had determined to create into another Bokhara, closed to foreign trade and travel. Instead of being called upou to indemnify Japan for her part in an alliance which precipitated the war, China escaped scot free, and even had her provinces returned to her, the first and only instance we are aware of where such magnanimity on the part of a victor is recorded. China escaped paying the penalty for her double dealing by reason of the diplomacy which maintained the existence of the treaty of alliance a profound secret until 1919.

New facts call for a reconsideration of all cases, whether with nations or individuals. Judgement has often been reversed and the original verdict set aside after a lapse of years by the disclosure of new evidence. This has a special bearing on the much discussed Manchurian question, and it was the revelation of this new evidence in 1919 which modified our own views on basic Far Eastern problems. The publisher of The Far Eastern Review carried the brunt of the newspaper campaign in the United States in 1915 against the pretenses of Japan in the twenty-one demands, and it was admittedly due to these labors that the American government placed on record in its memorable note of May 15 of that year, its refusal to recognize any treaties which might in any way impair the rights of American citizens in China or the principle commonly known as the "open door" principle. We fought that campaign for China in complete ignorance of vital facts bearing on the Manchurian situation. We have never reversed our opinions, however, on other matters, and have strongly urged the Japanese at all times to return Shantung to China at the earliest opportunity, withdraw their troops from Hankow and in every way prove by actions the sincerity of their friendly professions towards their weaker neighbor. At the time we acted as " counsel for the defense " of China's case in 1915, the existence of the Li-Lobanoff treaty was still a profound seeret. Once the text of that document was revealed at Paris it compelled a complete modification of established views, and explains in part, why, since that time, we have been unable to conscientiously support a secret diplomacy which compelled Japan to pay such a terrible price.

We have explained these matters fully in previous articles and quoted Count Witte at length in support of our views, but to date the majority of Far Eastern experts have preferred to ignore the importance of these revelations or their bearing on fundamental problems. No Chinese or American writer has commented on a document upon which is built the history of the Far East since 1895, and we have reason to believe that it was our own repeated references to its existence, that finally called forth at Washington an official acknowledgement of its text by the Chinese delegation, at the call of Mr. Hughes for the filing of secret treaties. We were quick to see in Paris that the facts surrounding this alliance completely undermined American policy in China, and placed John Hay in the position of advocating a doctrine based on the recognition of China's sovereignty, after the latter had willingly handed over and impaired her integrity in order to be revenged upon Japan. A policy that could not and did not preserve Japan from attack by Russia through the territories of the nation the policy was created to benefit, is, on analysis, no policy at all, but a mistake due to secret diplomacy, that worked out to the advantage of Russia.

The importance of this document, tardily acknowledged by the Chinese delegation at Washington, seems to have been lost even in subsequent discussions on Far Eastern problems. It was only recently, that the adviser to the president of the republic of China, Mr. B. Lennox Simpson, quoted the Russian statesman in order to strengthen China's contention that the Russian government was not the owner of the Chinese Eastern Railway. When Mr. Simpson, in his dual capacity of Far Eastern expert and adviser to the president of China, quotes Count Witte in order to fortify a case for the Chinese government Witte's evidence must be accepted in other matters. Witte's testimony concerning the Li-Lobanoff alliance must therefore carry conviction, and with the subsequent filing of the treaty at Washington, China stands exposed before the world of having secretly aided, comforted and encouraged Russia by ceding her territories to the latter in order to revenge herself upon Japan. When it is recalled that this secret treaty of alliance was in full operation during the Russo-Japanese war, and that in conformity with its provisions, the Russian Baltic fleet might have entered the port of Foochow and employed it as a base for recoaling and refitting before hazarding the great battle

of the straits of Tsushima, it would have meant for Russia the difference between defeat and stalemate. As admitted by Mr. Lennox Simpson in his new book, " those amongst the delegates at the Washington Conference who had personal knowledge of the Far East were impressed by this flask of lightning into the murky past!

When it is furthermore recalled that Russia played false to her ally and would have annexed Manchuria and closed it to foreign trade, the Japanese are fully justified in the claim that they restored China's sovereignty over her lost Three Eastern Provinces. This, notwithstanding the secret alliance which made the Russo-Japanese war possible.

As to the twenty-one demands they went too far and covered too much ground. If granted, they would have made China for all practical purposes, a vassal of Japan. It can, however, be said in extenuation, that Japan was sorely provoked and hard pressed, owing to China's continued intrigues with Russia, either direct, through her ally or through her financial agent. It cannot be denied that Russia was exerting every effort (in which she was supported at all times by France and Belgium) to get into a position that would enable her to resume the conflict terminated by the truce of Portsmouth. Her way was made easy by the weakness and supineness of Chinese officials who paved the way for Russia to dominate their country and strike at Japan from an unprotected flank. Russia's activities in Mongolia compelled Japan to demand the right to construct the Taonan-Jehol railway, already referred to, and later on when it became evident that Russia had split China in half, north to south and east to west by her strategic railways, and that China had secretly handed over to France exclusive railway privileges in Kwangsi, and was hastening the day of her undoing by other concessions impairing her sovereignty, Japan had no alternative but to make sure of her position in Kwantung and Manchuria and enable her when the time comes, to defend not only her own but the integrity of China.

The twenty-one demands could and should have been reduced to one, but true to Oriental diplomacy, Japan lumped together all that she could think of in order to gain her main point. Had Japan confined her demands to the extension of the Kwantung lease she would have obtained all that she had a right to expect to receive from China. In fact, there was no hesitancy on the part of China in granting this extension, as the records of the negotiations go to prove. Japan simply overdid it and lost out before world opinion by attempting to conceal the truth. It was a stupendous blunder, one which cost Japan dearly in the esteem of all other peoples.

However, the basic necessity of holding Kwantung still remains, perhaps stronger than ever, and there is little likelihood under existing conditions that Japan will admit any discussion of the treaty which assures her territory and that of China against further agression from the north. In the twenty-one demands, Japan appeared before the world in the rôle of an aggressor. Since then, she has surrendered or withdrawn all these demands, except one. She insists upon the validity of the Manchurian treaty which extends the Kwantung lease to 99 years. The other clauses of the treaty are not obnoxious in themselves, as by reason of the most-favored-nation clause in other conventions, they extend automatically to all other nations. The rights so obtained are not exclusive to Japan.

In holding Kwantung, Japan's position is changed. It is not a spirit of aggression or desire to impair China's sovereignty which impels her at this time to retain this strategic vantage point. She remains there to defend not only her own safety but the integrity of China during such time, at least, as China's remains unable to discharge her international obligations in these regions.

There remains one important angle to this question which should not be lost sight of. The masses of Japan have supported the liberal statesmen in their many concessions to world opinion and strongly approved of every effort to regain the good-will and friendship of China and make amends for past errors in diplomacy. In fact, it may be said that the cardinal feature of Japanese policy at this date is based on the re-establishment of cordial relations with her neighbor. There is evidence, however, in the Japanese press, that the limit of concessions has been reached and that any attempt to bring pressure to bear upon Japan in order to compel her to evacuate Kwantung next March, will crystallize into a patriotic movement lining up the nation solidly behind the militarists. Liberalism in Japan would then receive a set-back for another generation.

The Japanese already feel that they have surrendered more than any other great power in the interests of world peace, and especially in order to work in harmony with the United States. Any campaign to compel them to relinquish a strategic advantage upon which the very safety of their empire depends, will be more than they will stand.

It is not altogether improbable that the drift of world events, coupled with the agitation over the validity of the Manchurian treaty, will determine Japan to completely modify her present pacific and passive attitude, and following the lead of other powers whose vital interests have been placed in jeopardy, insist upon a readjustment of the *status quo* that will permit her a free hand in Manchuria. Japan may do one of four things. She may call upon the United States, Great Britain and France to enforce the principle of China's integrity in Mongolia. She may demand that China herself be called upon in the interests of world peace to discharge her international duties and defend her own integrity and neutrality. She may demand the right to co-operate with China as an ally in enforcing the consortium doctrine, or, failing in the above, Japan may determine that her own interests are paramount and act as the sole defender of China's integrity and take such measures as she deems fit to assure her own safety.

It stands to reason that no other powers will send troops into Manchuria or Mongolia to enforce a paper doctrine against Russia. Least of all will the United States send an army across the Pacific for this purpose. In fact, the way things are drifting, it will not be long before the United States will return once more to the days of 1917, Chinafied and emasculated by the pacifists, powerless to defend herself against any first-class enemy. Britain and France have troubles of their own and will be more likely to give Japan their blessing and tell her to look out for herself. It is difficult to imagine China at this time sending a force to oust the reds from Mongolia, and if the past is any criterion for the future, an intense jealousy will seek to obstruct any alliance or military co-operation between Japan and China for mutual defense. There remains the alternative, the last resort of a proud spirited fighting race facing slow strangulation through the operation of self-denying treaties entered into for the advancement of world peace, that is to say, peace in Europe, peace in the Pacific and the hamstringing of Japan in Asia.

" Kemal Pasha overthrew the treaty of Sevres and defied the allies in Europe. It may be that Japan, to protect her vital interests, will be compelled to follow his example in order to preserve the integrity of China and the peace of the Far East." These are the words of a highly placed Japanese army officer in concluding a general *resumé* of the present situation. They are significant, and to the point. They carry this warning from Japan to the other powers: " Make good your paper doctrines and protect the integrity of the Chinese republic in Mongolia, or stand aside while we do it ourselves." In the present condition of world affairs there is little doubt of what the answer would be.

II. MANCHURIA

The Other Side of the Question

Japan At the Parting of the Ways

LET us now look at another side of this question. It may not reflect the views of the Japanese government as at present constituted, but that it is advocated by a considerable section of Japanese opinion is attested to by editorials in many influential newspapers. We must face the possibility of Japan falling in line with other trading nations and scrambling aboard the Red band wagon while there is still room in the front seat. Japan may resume friendly relations with Russia, she may enter into a new commercial treaty, and, who knows, she may go one step further, renew the alliance of 1916 and work in harmony with the Soviet for the defense and advancement of their mutual interests in Asia. There are many things that Japan can do that will nullify the understandings already arrived at, which at bottom, all tend to circumscribe her activities and power of defense.

The Japanese are not blind. When they view the efforts of British and American financial interests to gain the good-will of Russia and gather the fattest plums from the wide spreading concession tree, a people forced to look towards Eastern Asia as the source of their food supplies and raw products are not likely to remain altogether inactive while their future is being handed over to others. As the *Osaka Mainichi* puts it:

"In the event the Far Eastern government is annexed by the Moscow government and Soviet rule is extended as far as Vladivostok, what policy is the Japanese government going to adopt ? If all that the Japanese government authorities and militarists have been saying about the Soviet rule is to be taken at its face value, this must be said to be a very serious situation. Even Count Uchida, the foreign minister, declared in the diet that the object of the maintenance of the Japanese troops was to prevent the spread of Bolshevism. If this was so, how can Japan effectively prevent the spread of Bolshevism now that the Japeneso troops are withdrawn from Siberia and the Soviet rule threatens to extend to Vladivostok ?

But we incline to the belief that nobody will be really alarmed by the new situation. For we know that the theories so far advanced by the government authorities and militarists were invented simply for the purpose of justifying the continued maintenance of the Japanese troops. They never seriously thought that the Japanese people, if left to themselves, would be converted to Bolshevist ideas.

The dissolution of the Far Eastern republic and the display of red flags throughout Siberia need cause no alarm in the Japanese minds. The necessity of the moment is how to shape the policy of the Japanese government to meet the new situation. In other words, it is important that the Japanese people should look the new fact full in the face and devise the best means possible to cope with the new situation. As we have urged in these columns, it is incumbent upon the Japanese government to try to promote the state interests on the basis of friendship with Russia."

From the above, it would seem clear that the *Mainichi*, speaking for the great industrial community of Osaka, would rather see its government follow the lead of Great Britain and America and get in on the ground floor while the door is open. The *Japan Times*, in one of its severe criticisms of the foreign office, is also alarmed over the many commercial advantages secured by others while Japan is still on the outside, and asks :

"What plan have our diplomatic authorities in mind for dealing with Russia ? While they are hesitating and undecided, adopting the watching and waiting attitude, the Europeans and Americans lose no time in reviving economic relations with Russia and have already established good foundations for re-opening connection with Russians economically.

The foreign office authorities are apparently waiting for the arrival of the time when the Russian government is willing to accept Japan's demand for compensation on account of the damage caused by the Partizan raid on the Japanese in Nikolaivesk. No doubt Russia is held responsible for the regrettable affair, but at the same time Japan should listen and consider Russian claims. The Russian delegate M. Joffe declared at the Changchun conference that Russia suffered immensely through the troops of Japan and incurred an estimated loss of approximately 100 million yen through the devastation of agricultural produce, requisition of farm houses ; stoppage of fishery and communications, etc. The claim of the Russian delegate is not without some reason. But if the spirit of mutual concession is not adopted any amount of negotiations between this country and Russia will not avail. In the meantime the concessions are going."

This also indicates that certain elements in Japan are anxious to follow the "Business First" slogan of other trading nations, and let vital strategic policies go hang. The above and other similar expressions of Japanese editorial opinion reveals a desire to re-open relations with Russia, which, in the very nature of things, will bring about an understandng in regard to their respective rights and positions in Manchuria. Typical of the reading matter wh.ch sets the Japanese to thinking seriously, is the interview between the Moscow correspondent of *The Times* (September 28) with the chief of the delegation of the Far Eastern republic sent to the Washington conference, in which the latter says :

"The Japanese are out for the northern half of Saghalin, and large concessions in Kamchatka and the Priamur, and they will not be content with less.

"Meanwhile, America is interesting herself more and more in Siberia. General Graves, formerly in command of the American force which landed at Vladivostok in 1918, and now interested in various concessions in the Priamur, is on his way to Vladivostok from Seattle, along with Mr. Grossbardt, an engineer with extensive Siberian experience, and the representatives of several large financial concerns in the States. They are all interested in those concessions, and so is *General Wood*, Mr. Henry Hunt, of Cincinnati (engineering firm), Messrs. Montgomery & Co., of New York (bankers), the National City Bank, the Koehn Loeb Company, the Guarantee Trust Company, the Equitable Bank, the Baldwin Locomotive Company (which is talking of repairing all the railways in the territory of the Far Eastern republic, if normal political relations are restored between that government and Washington), Messrs. Funston, of New York and St. Louis (fur people), and Robert Dollar, timber merchant, who is getting forest concessions in Eastern Siberia.

"The concessions which General Graves is said to be after are gold ; but personally I think that no hard-and-fast agreements have so far been concluded between the Chita government and any American groups. General Graves, I take it, is simply going to Siberia to have a look around ; and I think that he will find labor, political, economic, and transport difficulties so great that no work can be done for years. . . . By the time my informant and his delegation reach Chita, General Graves and his friends will be there, and arrangements about Russo-American commercial co-operation in the Far East will have been begun. It was probably a knowledge of this activity on the part of the Americans in Eastern Siberia that caused the Japanese to announce recently that they were leaving Vladivostok, and to agree to an exchange of views with the representatives of the Moscow government and of the Far Eastern republic.

"The Baldwin locomotive people are to repair all the railways in the Far Eastern republic, and other large American concerns are talking of undertaking other work and taking up other concessions ; but so far this has not got beyond the talking stage, and all depends on the regularization of political and commercial relations between Russia and the States. Possibly, said my informant, America will first recognize the Far Eastern republic and do business with her, and then be led on to recognize the Moscow government.

"He maintains that the Far Eastern republic is not communist, but a democratic state, independent of Moscow, but under Moscow's protection at present owing to the Japanese menace. He looks forward to the time when Vladivostok will be quite clear of Japanese and will constitute a door opening out towards America, and with nobody blocking it. When that day comes America will do very big business in Eastern Siberia, as she did before the war."

The reference to General Wood being interested in Siberian concessions is pure piffle and indicates the extent of the belief in Russia that Americans of all classes are anxious to get in on the ground floor. The above interview is supplemented in the *Japan Times* by the following :—

"While our diplomatic authorities are indulging in their wonted idle day dreams and forming mistaken policy towards China, the ambitious Americans have succeeded in courting the goodwill of the Chinese and won both their trust and rights and interests from the Chinese. Again while the Japanese diplomats were occupied in endless and useless negotiations with the Russian delegates at Changchun, a certain American concern obtained the lease for the oil district in Northern Saghalien and will start working the field shortly. Though outwardly against Russia, the Americans have secretly shaken hands with the Russians and are securing rights and interests in Siberia ahead of all other nations.

"Not only America, but Britain also is anxious to revive economic relations with Russia and France is casting sidelong glance Russiawards. The latest dispatch from Moscow says that France is anxious to revive her old friendship with Russia and re-enter an alliance with that country. With this in view, France is opposed to Britain's Dardanelles policy and wants to support Russia, thereby to court the goodwill of Russia. In other words, France objects to the proposal of Britain to solve the Dardanelles problem, excluding Russia, and insists on the injustice of settling the question without Russia's participation in the negotiations.

"While nearly all of the world powers are eager to court the goodwill of Russia in order to secure rights and interests in Siberia and thereby enhance their national coffers, Japan alone refuses to shake hands with Russia and commits the folly of missing a fine chance, open to her, for securing economic rights and interests in Siberia, which will fall entirely into the hands of far-sighted nations and be lost to Japan when she wakes from her slumbers at the eleventh hour. Who knows when another Washington Vanderlip may appear and carry away the right of exploiting the vast, inexhaustive, and rich resources of Siberia, lying so closely in Japan's neighborhood ?

"Remarkable are the activities of the Americans, who fixing their eyes on these resources of Siberia, are striving to secure rights and interests to explore and exploit the world's treasury of wealth in Saghalien, the Maritime province and Inner Siberia.

"A report to hand says that only a few days ago the American warship *Monoghan*, conveying several American congressmen and representative American businessmen, arrived in Vladivostok on an exploration trip to observe the condition obtaining on Commandorsky island, called the world's great treasury of fur seals, and the coast district of Kamchatka. The party is reported to have already concluded its mission and reached Vladivostok with a view to further observe the condition in the Omsk district in Inner Siberia. This is just a single instance, illustrating the daring spirit and far-sighted enterprise of the Americans."

We have quoted the above editorial at length as representative of a certain section of Japanse thought. If the Japanese accept these stories as true, they are justified in believing that advantage is being taken of their disputes with Russia and China to supplant them economically in regions from which they were compelled to withdraw under pressure of foreign opinion. It is clear to the close observer that the Japanese are awakening to the suspicion that in Siberia, as in China, other interests have taken advantage of their vital strategic necessities to undermine them economically. With the prospect of China declaring the Manchurian treaty null and void supported by foreign sympathy, and thus destroying her economic foothold in Manchuria, Japan would then be dependent upon Eastern Siberia for a large part of her raw products and other necessary supplies. Under these conditions, with all doors closed to her people in lands dominated by the white man, debarred from settling in China through the operation of laws which exclude foreigners from owning land outside the treaty ports, and confronted with the possibility of relinquishing her position in Kwantung, while watching American and British concession hunters skimming the cream from the Russian business, it is not to be wondered that a considerable section of public opinion in Japan is now advocating recognition of the Soviet, the establishment of friendly relations, restoration of trade and recognition of mutual interests in disputed territories.

In plain words, the operation of Western diplomacy combined with the moral support of the West to China in raising the issue of Japan's position in Kwantung, may have the effect of throwing Japan into the arms of the Soviet as the one assurance that her vital economic interests in Manchuria will be respected.

This element in Japan believes there is little to be gained by casting in their lot with America, Great Britain and France, whose altruistic policies towards China and Russia forced a surrender of their vital strategic and economic positions. The operation of these same policies has permitted Russia to once more regain a position inimical to Japan's safety, where, if matters are permitted to drift, the issue of 1904 will have to be fought out anew. Instead of advancing her economic and tactical position by an alliance with Britain, America and France, Japan finds herself stripped of all advantages and once more face to face with Russia in Manchuria with a movement launched with the moral support of a large section of Americans and British, to deprive her of her key position. The time is fast approaching when she must either take on her own shoulders the maintenance of the consortium principles and defend the integrity of China, or, follow the road of least resistance, by joining the procession and climbing into the Pink painted band wagon.

If Japan should elect to take this path out of a difficult and dangerous situation, what about the future? Why should Japan fight Russia for the maintenance of a principle that no other power will use force to uphold ? Why should not Japan be friends with Russia and resume their understanding in regard to each other's positions in Manchuria and Mongolia ? Why should Japan follow along in the company of partners who at every turn are reaping the commercial advantages while she is being reviled and held up to world scorn for practicing in Asia what other powers are applauded for doing in Europe ? If this line of thought should prevail and the people and government of Japan elect to resume friendly relations with Russia, and so obtain recognition of their economic position in Manchuria and the right to exploit valuable concessions in Eastern Siberia, who would check the forward moves of the Soviet backed by Germany in other parts of Central Asia ? If Japan declines to antagonize Russia in Asia, what then ?

Russia has many friends in Japan and it was the weight of their opposition as much as foreign criticism which finally inclined the government to withdraw its troops from Siberia. If their policy should prevail, it would not be difficult, at this time, to bring Japan and Russia together in an understanding that would have a most far-reaching effect on the Asiatic problem. Japan stands at the parting of the ways.

III. MANCHURIA

STUNG!

NOW comes Viscount Takaaki Kato, Japan's foreign minister in 1915, who drew up the twenty-one demands, and states that there are no grounds for the allegation of China that the treaties based on the demands were signed under compulsion." "THE ULTIMATUM," the viscount declares, "WAS SENT TO CHINA ON THE REQUEST OF THE CHINESE GOVERNMENT IN ORDER TO SAVE THE FACE OF THE AUTHORITIES OF THE NATION"! ! ! ! !

Kato's statement is the most important truth in recent Far Eastern history. It is fundamental. Here we have been laboring under the delusion all these years that defenseless China was the innocent victim of Japanese aggression, forced to sign away her rights at the muzzle of the gun. The whole world has responded to her appeal for sympathy. Japan's ultimatum of 1915 has been the pivot upon which Far Eastern history since that date has revolved, the thesis upon which scores of weighty volumes have been written and scattered broadcast over the world indicting Japan as the ruthless robber, the cold-blooded aggressor, the disciple of Germany in Asia. The ultimatum lined up every American on the side of China and laid the foundation of that hostility which influenced our diplomacy at Paris and led to the calling of the Washington conference to settle our differences. Commencing with the writer, who carried the brunt of the battle for China in 1915, down the line through a list of brilliant journalists, diplomats, advisers and others, who accepted without question China's version

of the negotiations surrounding the twenty-one demands, we all stand before the world as having been used by secret Chinese diplomacy to wage a fight on high moral grounds in order to preserve the face of a scheming dictator seeking Japan's recognition of his right to mount the dragon throne.

The evidence is conclusive that the secret diplomacy of Li Hung-chang precipitated a most disastrous war between Russia and Japan, in which China escaped paying the penalty, in fact, emerging from the conflict as the injured and innocent victim. Now we have the confession of Viscount Kato, which says in effect, that the secret diplomacy of Yuan Shih-kai, the concealment of the most vital fact in the negotiations surrounding the twenty-one demands, created an international political situation which nearly culminated in a war between the United States and Japan, and in which by reason of the profound secrecy maintained, China once more poses as the injured party.

Up to the time we go to press, no newspaper in China has published Kato's statement, and dollars to doughnuts the disclosure has not even been telegraphed to the American or British press by the regular correspondents in Tokyo. Upon the truth of this statement hinges the professional standing scores of journalists, statesmen and diplomats, nay, even the policies of governments must be radically modified to meet this astounding disclosure.

If true, and Kato is the one man competent to make this confession, it is quite evident that Chinese officials are in no need of expert foreign advice. They can give foreign diplomats cards and spades with the joker thrown in, and beat them at their own game. Bret Harte was right:

" In his sleeves, which were long,
He had twenty five packs."

We confess an admiration for officials who can systematically " put it over " the keenest experts and observers, mislead foreign governments to the point of precipitating hostilities, and look childlike and bland while a horde of advisers are playing their game for them. What we cannot understand is the remarkable reticence of Viscount Kato, who, in order to save the face of China, permitted the face of his own country to be lost. Imagine the situation. Pressed to accept the demands, Yuan confidentially suggests that in order to save his face, Japan should present an ultimatum. Kato falls into the trap. Maintaining the most profound secrecy about his part in the incident, Yuan broadcasts the story of Japan's rapaciousness with the result that world opionion swings solidly behind China while Japan is ostracized as impossible, another Germany. Kato dared not reveal the truth and invite attention to his defeat. Only, at the eleventh hour, when China is preparing to press for the retrocession of Kwantung, does he break the silence of seven years, and admit that he was " stung."

The interesting part of this disclosure is that Dr. Sun Yat-sen has insisted upon this version of the facts ever since 1915. He has declared, on several occasions, that it was all a put up job on the part of Yuan who was willing to place China under the tutelage of Japan in exchange for the latter's recognition of the new dynasty he was even then preparing to found. Sun corroborates Kato in that the ultimatum was faked to save the face of Yuan, and permit him to go before the nation as being compelled by superior force to accept the new conditions. At that period Sun was an exile in Japan, working in close harmony with the Japanese general staff. He knows what he is talking about.

The Chinese beat us at our own game with the cards stacked against them. They need no champions or coddling. They are in no danger of losing their independence as long as a sentimental foreigner survives or as long as other nations eye each other with jealousy and fight over the prospect of winning their good-will. A Chinese philosopher a century or so hence will sit on the ruins of London Bridge or the rusting scrap heap that was once the Woolworth Building and chuckle quietly over the fool mistakes of the wild barbarians who tried to hustle the East and teach his ancestors how to do things. This disclosure of Kato will wreck the reputation of many highly placed experts. The very last thing that Mr. Lennox Simpson explains in his recent book "An Indiscreet Chronicle From the Pacific " is the " true facts which have hitherto been closely guarded" surrounding the events leading up to and the reasons for the presentation of the "ultimatum." His version disagrees with that of Viscount Kato and Dr. Sun just one hundred per cent. At any rate, after reading the "true facts" as revealed by the high adviser to the president of China and the *truth* as disclosed by Viscount Kato, we retire to the background as an authority on these matters. We leave it to the high adviser to prove his " true facts " and answer the statesman of Japan, and will watch from the gallery the efforts of other experts to extricate themselves from the mess. It will be interesting to see how they accept the statement of Viscount Kato.

IV. MANCHURIA

Equal Opportunity in Manchuria

WE cannot close this presentation of facts surrounding the Manchurian problem without some reference to an article entitled " Japan in Manchuria to Stay," appearing in the columns of our sprightly local contemporary, *The Weekly Review*, that " aggressive official American organ " whose policy is one hundred per cent. different from our own. The following may help to explain why such a wide divergence of opinion can exist between two exponents of American ideals in the same field, and indicate that this difference is one between hyphenated American sentiment and every-day-horse-sense.

Mr. Charles Dailey, the writer of the article, admits that Japan is in Manchuria to stay. On the whole his article is one of the sanest that has yet appeared on this question, but he destroys the value of an otherwise important contribution to a serious discussion, by harking back to the old fable about Japan's special privileges in that territory which gives her traders the advantage over all competitors. In the Manchurian treaty of 1915, signed as the outcome of the twenty-one requests, Japan obtained for her subjects certain rights as to residence and trade outside the treaty ports, and nearly every superficial writer on the subject has since accepted the first impression that these were exclusive, when, as a matter of fact, through the operation of the most-favored-nation principle, they automatically extended to all other treaty powers. Japan therefore has no special position or trading rights in Manchuria not enjoyed by all other nations. This was admitted by Baron Kato at the Washington conference, when, speaking for his delegation on November 19, he said:

" We adhere without condition or reservation to the principle of the 'open door' 'or equal opportunity in China.' We look to China in particular for the supply of raw materials essential to our industrial life, and for food-

stuffs as well. In the purchase of such materials from China, as well as in all our trade relations with that country, we do not claim any special rights or privileges and we welcome fair and honest competition with all nations."

No Japanese statesman, diplomat or publicist has ever construed the Manchurian treaty of 1915 as conceding benefits to their country, not shared by all. We emphasize this situation, and invite the attention of all sober-minded Americans to the fact that these continued exaggerations concering conditions in Manchuria operate to keep them from enjoying their treaty rights, and to deter them from establishing branch offices in this province. As a result of years of misrepresentation, American firms have developed a case of cold feet in regard to the Manchurian field, and handed over their business to Japanese or British interests. At the present moment, there are just two American firms registered in the American consulate at Dairen, the ubiquitous Standard Oil Company and its pushing competitor, the Texas Company, with a young American occupying desk room in the office of a Czech concern, representing the important vegetable oil house of Aspergren & Company of New York. This is all.

In fourteen years, the South Manchuria Railway Company and allied Japanese industrial enterprises have probably expended $100,000,000 gold for American materials, not to mention the vast amounts that go to make up the exports of bean oil and other products. An equal amount has also been expended for British and other foreign materials. The impression that American firms could not compete in this territory has tended to keep them out, while the vast orders for American materials have been placed through Japanese and British representatives of our manufacturers. The British have obtained their fair share of the orders for British materials through their own firms established in Dairen. The practice of the South Manchuria Railway Company is to call for tenders for supplies and confine their patronage to firms having actual representation in Dairen, a very wise and necessary policy in building up a new city under its own administration. The only sufferers as far as we can see, are American firms who have listened to the tales of their countrymen who threw up the sponge early in the game, and have ever since been damning the "Japs," in order to justify their own failure. One hears little growling or grouching from the British firms in Dairen, who say little, saw wood, and see that British manufacturers receive their share of such business that is offering. The great volume of orders for American material has gone through the Japanese representatives of American manufacturers. A few American middle men have suffered, but American trade on the whole has benefitted. There is no reason, however, why this condition should be perpetuated. If American trading firms want the orders the place for them is in Dairen. They are assured of a square deal, despite the fables to the contrary.

Mr. Dailey, in the article in *The Weekly Review*, stresses the point that American firms are discriminated against because of the operation of the Manchurian treaty and cites the following instance to support the contention that this interpretation of the treaty has been accepted by the Chinese authorities:—

"So Chang Tso-Lin seems to be barking up a hollow tree when he says that no matter what Peking may have done under force or duress or whatever the enemies of Japan accusse her of applying—no matter what—Manchuria never has recognized the twenty-one demands. The facts are that the existence and provisions of the new treaty have been recognized by Chang Tso-Lin's ablest henchman, General Sun of Kirin."

"And the recognition came in a way quite unfavorable to the United States, or any other country interested in trade in interior China. Shipments of oil to points in Kirin province are being heavily taxed as a local measure and the Standard Oil Company of New York recently had the matter taken up with the officials of Kirin province, because there was discrimination in favor of the Japanese. It was in reply to this protest that the governor of Kirin made the recognition of the 1915 treaty, if any recognition were required after its enforced acceptance by Peking."

"General Sun, in an official letter to the provincial treasury held that special local taxes could be levied against the American concern because it, with other foreigners with the exception of Japan, is denied the right of establishing agencies at non-treaty ports. The exception in favor of Japan was cited under the 'new treaty' between China and Japan, which means the treaty enforced under the twenty-one demands. Under this treaty, General Sun pointed out, the Japanese are permitted to establish agencies and to carry on business anywhere in South Manchuria, including Kirin province, and in Eastern Inner Mongolia. This clinched the case for Japan. Incidentally it put the seal of commercial handicap upon other foreigners attempting to do business in the non-treaty ports of that region."

It would appear from this that the tuchun of Kirin interpreted the Manchurian treaty to meet his urgent demands for revenues and "held up" the Standard Oil Company for taxes he did not dare to impose upon the Japanese. If, as General Sun points out in extenuation, "the Japanese are permitted to establish agencies and to carry on business anywhere in South Manchuria, including Kirin province, and in Eastern Inner Mongolia," by the same token the same privilege extends automatically to American concerns. The truth that shines out from this instance, is not that Japan has any special advantage over American firms, but that General Sun has for his own purposes construed the treaty to justify an irregularity. Japan is not to blame for this, and it would furthermore seem, that the Standard Oil Company has a legal right to claim and recover not only such taxes as may have been paid in excess of those levied upon Japanese produce but such damages as would compensate for the loss of the trade handed over to its competitors by General Sun's failure to recognize the most-favored-nation principle, which applies in this case.

The situation in Manchuria is identical as that which existed a year or two ago, when such a hullabaloo was made over alleged Japanese discrimination against American trade in Tsingtau, and where subsequent investigation disclosed the fact that there were only two American firms on the ground, the Standard Oil Company and Katz Brothers, the latter working in close co-operation with the Japanese. The reports of the American consul at Tsingtau bore witness to the fact that no such discrimination existed, that the field was open for Americans to enter on an even footing. The damage, however, was done to American trade by continued perversion of facts existing only in the imagination of certain agitators. American firms developed frigid pedal extremities and remained away, while their more adventurous competitors walked in and won out.

American business in Dairen, the commercial door to Manchuria, is conducted by British and Japanese firms because of this same propaganda. It is about time that a stop was put to such distortion of facts, which tend to discourage American enterprise in these regions. If the Standard Oil Company has been made the victim of General Sun by his failure to discharge the treaty obligations of his government, it certainly does not indicate discrimination against American trade by Japan. The shoe is on the other foot; China is the villian in this plot. Perhaps this may be accepted as an disinclination on the part of the American government to recognize these treaties. That, of course, puts the whole matter on a different basis, which works out to the detriment of the American trader until such time as the treaty is revoked. This carries the situation into realms of delicate international politics, and in view of Japan's determination to retain at all hazards her position under this treaty, creates a most serious question. We doubt, however, whether this view of the matter is the correct one, as it would call eventually for American armed support to China in demanding the retrocession of Kwantung and the nullification of the treaty. Perhaps the revelations of Viscount Kato as to how the ultimatum was invited may reverse current opinion on this much discussed problem, and open the way for American firms to enter Manchuria on an even footing with those of Japan and compete or co-operate for its development. Whatever rights Japan has acquired in Manchuria, aside from the extension to the Kwantung lease, are American rights as well. As long as the treaty is in operation, Americans are entitled to all its advantages. If we fail to exercise those rights, it seems unfair to shoulder our failure on to Japan.

V. MANCHURIA

Politics and Pedestals

" An Indiscreet Chronicle from the Pacific "

Being a Review of a Book with the above Title written by B. L. Putnam Weale, and published by Dodd, Mead & Company of New York. For sale by all Booksellers.

MEN'S legs are more important as a political indication than their hands and heads and should always be attentively studied," says Putnam Weale describing the "dislocated knees and small feet" of Secretary Hughes, denoting, according to the author " a proneness to the influence of others : a tendency to accept formulas without proper inquiry ; an absence of true convictions." " Questions are never indiscreet, answers sometimes are," is the maxim on the title page quoted from Oscar Wilde. This emboldens us to be inquisitive and ask if the Adonis-like proportions of the nether and pedal extremities of the hero of the forbidden palace were in any way dislocated on a memorable occasion by that " mighty up driven blow of his right knee " which curled up the chief eunuch guarding the untasted forbidden fruit of an emasculated emperor ? We ask this, because if the contour of a man's pedestals is any indication to his political balance, then the author of *Indiscreet Letters from Peking* and still further indiscreet chronicles from the Pacific should possess a marvelloulsly corrugated pair of artistic plinths, or a leg like unto the hind one of a Boston bull pup. Which calls for explanation.

A FUNDAMENTAL TRUTH

" I am thoroughly convinced that the blood-stained heights of Port Arthur will never be surrendered and the territorial lease cancelled until the part they played in destroying Russian imperialism has been fully and adequately recognized by China in messages to Japan."—*Putnam Weale.*

The publisher's note to the new book says that " Putnam Weale is the pen-name of Bertram Lenox Simpson, an Englishman in the political section of the office of the president of China. Beginning his official career twenty-six years ago, under the late Sir Robert Hart, the famous head of the revenue in China, he resigned after the seige of the legations and began writing books of which there are now nearly twenty to his credit. Of his former chief, he says, " He trained me with a rod of iron." His literary method discloses his early training. After the revolution of 1911-12 he received offers to re-enter the government service. But it was not until 1916, and the overthrow and death of Yuan Shih-kai, that he resumed work in the political department. Since then he has been sent on many missions and is *mainly responsible for the reports on foreign affairs*."

Mr. Lenox Simpson is an accomplished writer, the best the Far East has produced, but we incline to the belief that Sir Robert made the mistake of his brilliant career in not completing the training of his promising protege. If he had, the literary methods of Putnam Weale in political affairs might have been another feather in the cap of the great I. G., another monument to his training and handling of men. And to make this clear, we will quote from page 9 of " An Indiscreet Chronicle from the Pacific."

With the collapse of China the immense corruption of Russian imperialism had at last reached the Far East in force by the land route. Russia had been nibbling for a generation: now she opened her mouth and bit hard. The balance of power was not only changed by this event, but history inevitably took a new road far away from the sea-lanes which had until now monopolized attention. The greatest importance must be attached to this dislocation which has no parallel in the annals of the East, and to which is directly due practically all world disturbance during the last quarter of a century.'

Right here the author started out as Sir Robert would have him do, standing squarely upon an admirable pair of legs with both feet firmly planted in a truth. The collapse of China in 1895 and the secret alliance entered into immediately afterwards in order that China might be revenged upon Japan, is the KEY to all future political events in the Far East, the play which started every European power and Japan, to protect their interests in Asia by countermoves on the political chessboard. But because Mr. Lenox Simpson is the high political adviser to the president of China, and director of Chinese political propaganda, he would never admit a truth that throws the onus of what followed on to his clients. He is paid to avoid this. He makes a good job of it.

On page 11, after a brief *resumé* of other conditions, Mr. Simpson tells us :

" The Russo-Japanese war put Japan back where she had tentatively been in 1895, with the valuable addition of railways. IT IS FROM THIS MOMENT THAT THE MODERN HISTORY OF THE FAR EAST COMMENCES."

Right here Mr. Simpson shifts his foothold and steps from a solid foundation into a morass, flounders around for some 250 pages, then jumps out for a minute on to terra firma before once more slipping back into the bog, where he remains. If Mr. Simpson's first statement is correct and Russia's advent into Far Eastern politics is responsible for all world disturbances during the last quarter of century, then modern Far Eastern history begins in 1895 and not with the Russo-Japanese war, ten years later.

The immediate outcome of the Sino-Russian secret treaty of alliance was to present Russia with an ice-free port on the Pacific, at that time a direct challenge to British sea-power in the East, a menace to her hold upon India. When Russia started on her secret program to reach the northeast frontiers of India by means of strategic railways traversing the territory of her ally, evading her convention with Great Britain to confine her railway activities north of the great wall, the British government presented its demands to China, backed by an ultimatum, for compensatory damages. The Yangtze valley region was created into a zone of strategy to act as a buffer between India and Russia. Subsequently, to counteract the operation of the Sino-Russian partnership, Britain entered into the alliance with Japan. Instead of being an instrument for the impairment of China's sovereignty, the Anglo-Japanese alliance was a guarantee of her integrity jeopardized by her own foolish pact with a power intent upon her spoliation. The evidence of this is seen in the peace of Portsmouth, where China's sovereignty was restored over the territories she surrendered to Russia, and considered by the latter as part of her empire, to be converted into special preserves similar to her possessions in Central Asia.

When this fundamental fact is recognized, the bottom falls out of Mr. Simpson's elaborate case built up on another hypothesis. The book deals with steps taken largely on the initiative of Mr. Simpson to bring about the demise of the Anglo-Japanese alliance treaty, and to accomplish this, he ignores the origins of policies whose operation he denounces ; he eliminates from the record the

memorable months of 1898, when the "Battle of Concessions" parcelled China into zones of strategy, miscalled spheres of interest, and starts his history with the Russo-Japanese war, in itself the culmination of ten years of China's secret diplomacy.

Instead of frankly admitting, or at least referring to the causes underlying the signing of the first Anglo-Japanese alliance, and so justifying his own country before China for taking such measures for the protection of its vital interests, Mr. Simpson falsifies the record by insisting that the real rôle of the alliance was to impede the progress of and do for China the greatest disservice any foreign agreement had performed at any time in her history." As Mr. Simpson starts out to destroy this instrument, he naturally goes to extremes and ascribes all the woes of China to its operation, purposely refraining from any mention of the fact that it was China herself who invited and made it necessary.

We might write another volume analysing the "Indiscreet Chronicle from the Pacific," and, by comparing notes, show how the words and views of other advocates of extreme measures coincide with those of Mr. Simpson: how the desperate efforts in China to support Mr. Millard when he was calling for war in Congress, all played into the hands of the Peking plotters, how the campaign in England to intimidate the British government by the threat of a boycott of British goods if the alliance was renewed, synchronized with the agitation in Shanghai directed from Peking; how an international association in North China, consciously or otherwise, encouraged the Chinese by distributing confidential pamphlets calculated to incite hatred against Japan; in fact from the knowledge gleaned from Mr. Simpson's indiscreet revelations we might be justified in denouncing and arraigning the misguided sentimentalists, whose utterances and actions made possible the plot hatched in Peking to railroad the United States into hostilities with Japan.

It might be indiscreet to request Mr. Simpson to be a little more explicit as to the meaning of the word "WE," employed so often throughout the book. "In Peking, long before the world war, *we* had reached the conclusion that there were only two countries (America and Great Britain) important to the Chinese." . . . As early as the spring of 1920, *we* had decided in Peking that no reasonable hope could be entertained for China's salvation with this treaty (the Anglo-Japanese alliance) in the way." What do you mean, WE? Do you mean, Mr. Lenox Simpson, Putnam Weale and yourself; do you mean Putnam Weale and the Chinese government, or Lenox Simpson, and the other high advisers to the Chinese government? Who was responsible for this great war program in which "China would seek a rapprochement with the United States and offer her naval bases on her coasts together with any other concessions she may desire"? Who drew up the confidential plan called "The defence of the gulf of Chihli scheme, designed to protect the approaches to the capital, Peking, pending *American* mobilization"? Are we to suppose that here is where the "WE" is intelligible, and it means that Mr. Simpson and the Chinese government had the plan all drawn up to precipitate the "show down" and hold the gulf of Chihli pending the arrival of American forces? If ever an international intrigue justified the investigation of a joint congressional committee, this conspiracy hatched in Peking to plunge the United States into a war with Japan, calls for action. It was not Great Britain, France, or any other power, who was to rake the Chinese chestnuts out of the fire, but *America*. And at the head of this conspiracy, in full possession of all its secrets stands THE HIGH ADVISER TO THE CHINESE GOVERNMENT, the unofficial head of the Waichiaopu, who confesses in his introductory note to be "mainly responsible for the reports on foreign affairs."

The evidence seems conclusive that the high adviser to the Chinese government, working through the various Chinese publicity bureaus and other organizations, had the American community in China hypnotized, willing to sacrifice the lives of thousands of their countrymen in a terrible war, for the sake of covering up the mistakes and intrigues of a clique of paid international mischief-makers having their headquarters in Peking. There are no laws to protect a nation against damphool sentimentalists and paid propagandists and in the light of the disclosures of the past three years, it is high time the American congress bestirred itself to investigate this situation, and make impossible another such brazen plot to plunge the country into war.

There is no excuse for Mr. Simpson's ignoring of vital truths and building up his case on evidence he hoped might pass without challenge, for on page 193, he gives the text of the treaty of alliance between China and Russia of May 1896 as submitted to the Washington conference by the Chinese delegation after Secretary Hughes proposed that all such secret committments be filed. That China was not prepared for this is clearly intimated by Mr. Simpson, who tells us that the delegation obtained the text of this treaty by telegraph from Peking. This admission is proof that the Chinese advisers hoped to further conceal this document and hazard their case on its being forgotten. Mr. Simpson admits there was ample evidence during 1900 that both China and Russia were acting in terms of the secret understanding, several clauses of which had been duly executed. He acknowledges that it was in force during the Russo-Japanese war, and that if Russia had invoked Article 3, it would have meant the difference between defeat and stalemate. In view of this, it is inconceivable how such a clever advocate, could hope to carry conviction, by ignoring the basic evidence in the case.

Towards the last, in his summing up, Mr. Simpson drags himself out of the mire and muck of Oriental intrigue shakes the kinks out of his twisted pedestals and proclaims one more basic truth when he says:

"I AM THOROUGHLY CONVINCED THAT THE BLOOD-STAINED HEIGHTS OF PORT ARTHUR WILL NEVER BE SURRENDERED AND THE TERRITORIAL LEASE CANCELLED UNTIL THE PART THEY PLAYED IN DESTROYING RUSSIAN IMPERIALISM HAS BEEN FULLY AND ADEQUATELY RECOGNIZED BY CHINA IN MESSAGES TO JAPAN."

Exactly. Here speaks the true Far Eastern expert. This one paragraph almost absolves Mr. Simpson for the many errors he is guilty of in his most interesting contribution to Far Eastern history. Why could he not have commenced with this truth and built up his argument along these lines? Why should he not now begin to educate the Chinese to this wholesome fact? Why continue to surround his clients with a halo of his own making, screening their shortcomings, while reviling his own country and Japan for defending themselves against China's secret diplomacy?

If Mr. Lenox Simpson is an honorable gentleman and adviser, it is duty to the people whose government holds him "mainly responsible for the reports on foreign affairs," to undo his mistakes and strive to implant in the minds of the Chinese that Japan is their friend, that Japan saved Manchuria in 1905 and restored their sovereignty over a vast territory which by all laws of war they had forfeited. If Mr. Simpson, will now contribute his knowledge, his literary and political talents to bring about a solid and lasting understanding between China and Japan by urging the

Chinese to act upon his last statement, then indeed may the world hope for a proper solution to the Manchurian problem. He may then look back and be grateful for the iron training of his old chief and even aspire to outshine the great I. G. in prestige.

Reverting to pedestals, it would seem that all those who did not agree with or accept the formulas of Putnam Weale or insisted upon proper inquiry, came in for an inspection of their extremities. In the case of Sir John Jordan, although no reference is made to his legs or feet, their characteristics according to Putnam Weale's rule of thumb may be inferred, when he says that Sir John "had few ideas and always hoped for the best when his actions were producing the worst." Knowing how long Mr. Lenox Simpson was in disfavor with his own legation, it would indicate that this alleged paucity of ideas and "veneration for the foreign office," arose from Sir John's refusal to accept the false premises and formulas of the expectant adviser on foreign affairs. When we recall that it was Sir John Jordan who told the China Association last year that "nearly all of the trouble that has arisen in China since 1895 was due to Li Hung-chang's diplomacy," it is not difficult to understand why Putnam Weale and the distinguished representative of his country could not agree.

Now the facts would prove that Putnam himself is most prone to the influence of others and has accepted or invented the Chinese formula of how their troubles started, without proper inquiry. However, if he follows his latest hunch and restores friendly relations between the two nations he has labored for so long to part, he will become the greatest of China's many high advisers, and there is little doubt that a grateful sovereign on some of his many birthdays will affirm the premature accolade of T. P. O' Connor in the house of commons. We will be the first to acclaim "Sir Lenox" and wish more power and symmetry to the present somewhat battered and twisted index to his political acumen.

The Crime Against America

The Conspiracy Hatched in Peking to Railroad the United States into War with Japan

AN APPEAL TO AMERICAN EDITORS AND PUBLIC OPINION TO DEMAND A CONGRESSIONAL INVESTIGATION INTO THE ORIGINS AND RAMIFICATIONS OF THE PLOT TO FORCE HOSTILITIES IN THE PACIFIC

* * *

THE UNITED STATES HAS BEEN PLAYED FOR A SUCKER.—The evidence presented in the foregoing pages reveals the existence of a deep laid plot hatched in Peking to force the American people to take up arms against Japan in order to right the grievances of China against that nation.

A repetition of the horrors of the war in Europe was to have been brought home to the peaceful and unsuspecting people of America in order to support the immature and grossly partial conclusions of a group in Peking posing as experts on Far Eastern affairs.

Had it not been for the sober common sense of such men as Judge Elbert Gary, Mr. Thomas Lamont, and other equally patriotic leaders of American finance and industry, who at the very beginning of the agitation, lent their moral support to the counter campaign which culminated in the Washington conference, the agents of Armageddon would have succeeded in their devilish plans.

The story is a long one. The main facts are known. The recent book of B. L. Putnam Weale provides the key that makes clear what lay behind the recent war scare: it helps us to understand the inner workings of the Japanese boycott, the campaign for the cancellation of the Anglo-Japanese alliance and the agitation in Shanghai threatening British trade with similar reprisals; it explains the questionable methods employed in disseminating literature, calculated to fire the hearts of Americans into being the goat for China; it explains many other things.

Dr. Paul S. Reinsch in his letter of resignation to President Wilson calling for a "show down" with Japan, stressed the part the American navy could have taken in calling Japan's bluff and declaring that "Japan would be absolutely powerless in the face of a stoppage of commerce and a navy demonstration on the part of any one of the great powers."

This provided the plotters with the opening to abuse American sympathy, and we find Mr. Lenox Simpson saying the same thing in another way. "THE ULTIMATE PUNISHMENT WHICH SOME HAD SEEN FOR THEM (THE JAPANESE) IN A RIGID BLOCKADE OF THEIR COASTS BY AN ANGLO-AMERICAN FLEET, SEEMED TO HAVE DRAWN PERCEPTIBLY NEARER." His further revelation of the plan of campaign which provided for an alliance between China and the United States in which China would offer her naval bases to the American fleet together with the naval scheme for the defence of the gulf of Chihli pending American mobilization is convincing evidence that the indiscreet publication of Dr. Reinsch's letter of resignation was seized upon to push forward the plot.

The American ambassador at Tokyo, acting on instructions from Washington, categorically denies on behalf of the American government that it possesses any knowledge of the great Sino-American naval scheme drafted by the plotters in Peking. Yet the Americans in Peking were on the most intimate terms with everybody prominent in this conspiracy. Somebody blundered; somebody should have discovered this plot and informed the government, but from all appearances they were hypnotized, lulled to sleep by the flattering attentions of those who were using them as dupes.

If it was not criminal in its larger aspects, such a scheme would be grotesque, a mirth provoking joke, one which would have lured the American army across the Pacific, and even if our transports ever reached the Chihli Gulf, they would have found on disembarking—another Daiquiri.

We cannot, however, ignore the revelations of Mr. Lenox Simpson. He occupies a high position in the Chinese government. He communicated this secret plan to the prime minister of Canada in his official capacity. Where then were the Americans in Peking while this great plot against the peace of their country

was being hatched by the Chinese general staff? With an ex-American minister in the employ of the Chinese government as high political adviser; a retired American naval officer and former naval attache at Peking acting as marine adviser to the Chinese government, and a staff of diplomatic, army and navy attaches and a wonderful intelligence organization on the job every minute of the time, in close laison with Chinese officials, a plot was hatched under their very nose to force their country into war with Japan and they knew nothing about it.

A striking commentary on the working of this system is seen in the recent publication of Mr. Simpson's full confidential report to the president of China on the carrying out of his mission in the columns of the "Tientsin and Peking Times," a British newspaper published at Tientsin, from which it must be inferred that if the document was not released for publication by the chief executive of China, it must have come from the author. We understand it was stolen. Remarkable how easy it was for this British journal to obtain a stolen document, when the parties most concerned, were maintained in such profound ignorance of the original plot. This, in Peking, notorious for its facilities to obtain confidential information. This, in itself, establishes a community of inside interests that should merit and hold the attention of all honorable Americans interested in the welfare of their own country.

We do not wish to be misunderstood. From such knowledge of the facts as we have been able to piece together, the truth stands out in flaming letters a mile high, that this great international conspiracy, this super inter-allied board of strategy sitting in Peking so secretly, that the American legation knew nothing about it, had prepared a scheme that would have held the fort until AMERICAN MOBILIZATION. Mind you, not BRITISH mobilization.

And from the evidence so far presented, the president of the board in possession of the secret plan of campaign, and employing it as an argument to advance his mission abroad was . . . BRITISH. In the operation of this great triangular alliance, the Americans were the poor suckers who were to have pulled the chestnuts out of the fire. And we wish to say to our British readers, right here, that in making this statement, we are satisfied that these methods did not meet with the approval of the great mass of honorable Britons in this part of the world, or their government. This is proven by the reception given to Mr. Simpson in London.

The high points in the campaign are now before the world. It remains for an official investigation to piece them together and report the facts to the people of the United States, in order to show how they have been made the dupe of dangerous agitators appealing to their sentiment and sympathies by a perversion or a concealment of the main facts in the case.

It will be found that a group of fanatical anti-Japanese agitators were implicated in a conspiracy whose ramifications extended to other countries and whose dupes and tools occupied exalted diplomatic and governmental positions.

The evidence is officially before the world that the secret Sino-Russian alliance of 1896 found its logical aftermath in the Anglo-Japanese pact: that it opened Manchuria to Russia for the sole purpose of enabling this power to crush Japan: that it provoked and precipitated the Russo-Japanese war, to that date the most terrible conflict the world had witnessed: that its secrecy was so well guarded that even Chinese officials were ignorant of its existence: that China emerged from the conflict as the innocent and injured victim: that notwithstanding her part in an alliance which compelled Japan to make such bloody sacrifices, her sovereignty over her surrendered territories was restored, after it had been forfeited by all the recognized laws of warfare.

American policy in Manchuria has been based on the assumption that Japan was the aggressor, that she had no right to claim a special position after the sacrifices brought about by the secret diplomacy of China. The United States has been brought into the controversy by reason of the note of our government of May 16, 1915, and the wires are now being pulled to have us intervene in the question of the cancellation of the lease in March of next year.

The statement of the highest living Japanese authority is also before the world, and although it convicts him of having been tricked by Yuan Shih-kai, it tells us that the much denounced ultimatum which followed the twenty-one demands was specially requested by the Chinese government in order to save its face before the nation, a secret deal to obtain Japan's recognition of Yuan Shih-kai as emperor of China. For seven years this fundamental and most important evidence has remained a profound secret, and only when faced with the prospect of having the Manchurian lease declared null and void, does the truth come out.

Because of the secret diplomacy of Li Hung-chang in 1896 and Yuan Shih-kai in 1915, the sympathies of the American people have gone out to China, and have been played on to the point where we were to have been railroaded into war.

Mr. Bertram Lenox Simpson, the British high adviser to the president of China, the unofficial head of the Chinese foreign office "in charge of the reports on foreign affairs," confesses to having been sent on a secret and official mission to use his own methods to bring about the cancellation of the Anglo-Japanese alliance, and in pursuit of this object, reveals the plot that was all prepared to make the United States and China allies in the war with Japan. There is no evidence that the details of this plot was communicated to the SUCKERS, but it was fully and confidentially imparted to the premier of Canada, in order to influence his policy at an imperial British conference.

The story is almost complete. It remains for an official investigation to establish the facts and ascertain the identity of the misguided patriots who had so far compromised the nation as to lead the Chinese to believe we would enter into a treaty of alliance and use their ports as naval bases. The Chinese must have had some assurance that we would ally ourselves with them. Who is responsible for this secret diplomacy that would have carried sorrow to thousands of American homes and used the youth of America for cannon fodder to bolster up their schemes? The American ambassador at Tokyo has categorically denied that the American government had any official cognizance of the scheme for the defense of the gulf of Chihli. This statement tells us that the plot was hatched in Peking. By whom?

If the editors of America will make this clear to their readers, the howl of indignation that will go up from end of the land to the other, will force the government at Washington to take steps to ascertain the truth. LET US DEMAND THE FACTS!

* * *

A permanent peace in the Pacific can be firmly established only upon the secure basis of Sino-Japanese friendship. As long as misunderstandings exist between these two great Asiatic nations permitting international mischief-makers to ply their professions in Peking, the United States is in constant danger of being embroiled in war with Japan.

Secret diplomacy, truths half told and partisan propaganda will continue to breed suspicion, engender hate and promote strife. The great work of the Washington conference will count for naught while such conditions endure. The road to Pacific peace, the foundation upon which the stability, development and prosperity of China must be erected, the key to the expansion of foreign trade and the opening of immense markets, is a *rapprochment* between China and Japan.

The first step towards this goal is the recognition by China of her part in plunging Japan into a struggle for her national existence; to that date the most disastrous and bloody war in world history. The frank acknowledgement on the part of China of Japan's disinterested friendship in restoring her sovereignty over her lost Manchurian provinces, is the *sine qua non* to a settlement of the last outstanding point of disagreement between these two nations.

Japan is not the agressor in Manchuria. Japan is sincere in her oft expressed desire to reach an amicable and lasting understanding with China. Japan has no intention to further impair the sovereignty of China in Manchuria, recognizing she is there as a lease holder only. If we interpret Japanese opinion and policy correctly, they are even willing to forego certain phases of the leasehold rights and surrender jurisdiction over Kwantung and the railway zone WHENEVER CHINA PROVES STRONG ENOUGH TO DISCHARGE HER INTERNATIONAL OBLIGATIONS IN THESE REGIONS. Until such time, the mutual defense, the co-existence of both countries demands the presence of a power in Kwantung that will guarantee not only the integrity of China but safeguard the vital interests of Japan. The formula that justifies British occupation of Kowloon and the American-Nicaragua treaty, covers Japan's occupation of Kwantung pending such time as the legitimate owner of the territory can guarantee that her national existence will never again be placed in jeopardy.

American public opinion, American diplomacy and common sense can prevail upon the Chinese to exercise sound judgement and repair the breach in their relations with Japan. Through the operation of a secret diplomacy in which neither the people or the present officials of China can be held responsible, the seeds were sown which ripened into one war. The secret diplomacy of Yuan Shih-kai and the still more damnable secret diplomacy of the Peking Camarilla nearly precipitated a greater one. Only by heroic efforts was this last catastrophe averted. Let us put a stop to conditions which enabled a small clique of misguided foreign enthusiasts in Peking to devise plans of campaign and draft secret alliances which almost precipitated America and Japan into hostilities. American editorial and public opinion, brought to bear on the right quarters in Washington, can do it. It is the only way.

GEO. BRONSON REA.

British Engineering Trade in China and Japan

"The Eldorado of The Far East"

It is seldom that we tender advice to our British friends in trade matters, but in view of the somewhat strenuous campaign now being carried on in England to induce British firms to establish themselves in China, it may not be out of place to invite attention to facts which are obviously overlooked. From the many newspaper clippings which come to us from London, it is clear that the same tactics are being employed to influence British traders to come to China as were so successful in the similar campaign which flooded Shanghai with over 300 new American concerns two years ago, and whose inexperience precipitated the financial catastrophe of 1920.

It seems to be taken for granted that the road to commercial success in China is to increase the number of foreign firms already in the country, or, to employ the slogan of one of the American boom agencies, "in numbers there is strength: only by outnumbering the others can we hope to succeed. Come on in boys, the water is fine." And the Americans came in with a whoop, wetting their feet first, then walking in deeper and deeper, until they got over their head, went under and rose no more. The old established hongs of Shanghai paid the price for the activities of self-styled trade advisers who had nothing to lose themselves and everything to gain by increasing the number of firms in the treaty ports. It cost the established firms many millions of dollars or pounds for this campaign to pad the Hong Lists.

During the war, when British firms were practically unable to hold their own, there was some justification for the influx of new American firms into the China field, but it stood to reason that as soon as normal conditions returned, the firms not firmly rooted in the country would be compelled to shut up shop. This happened. Now there may be room for many new British trading firms in China, nevertheless, we incline to the belief that until conditions improve and a stable government once more guarantees life and property, any campaign to flood the country with new firms is not only prejudicial to the interests of established hongs, who have a hard enough time as it is, but a positive invitation to further financial disturbances.

Typical of the articles now being printed in England regarding the possibilities of the China market is one in *The Times*, entitled "The Eldorado of the Far East." The writer says that the "China trade is straining at the leash, eager to bound ahead. It needs but a turn of the political wheel, and a little improvement of the general situation, to open out a new and magnificent vista of trade opportunity." After a general *resumé* of trade returns which indicate the extent to which British trade may prosper by paying more attention to Chinese markets, he concludes by saying, "it depends upon the intelligence and enterprise of British traders to make good in this Eldorado of the Far East." The identical catch phrases which lured the inexperienced American trader to ruin two years ago.

It is true that prosperity in China needs but a turn of the political wheel, but the impulse that will make the wheel go round and bring stability to the government in Peking, is a large foreign loan, which may or may not accomplish its object. It is just possible that the hearts of the British investor are being fired to subscribe to the forthcoming Chinese bond issue which British papers inform us is a possibility. There is every evidence from reports in the British press that an independent Chinese loan advanced by groups outside the consortium is meeting with favor, and that considerable dissatisfaction prevails over the consortium pact which has prevented the flotation of a loan to the Wu Pei-fu faction. If the trade boom campaign now being carried on is part of the propaganda to pave the way for the successful issue of such a loan, the British investor might well seek more positive information about conditions here, from firms already on the ground. Although we do not always agree with the Hearst editorials the following from the *New York Journal* of October 2, is not without its significance :—

> "China is borrowing ten millions from bankers at Peking and elsewhere. Out of that the Chinese government will get eight million dollars. The bankers that float the loan will get TWO MILLION GOOD DOLLARS. The investor will get CHINESE BONDS. It is pleasant for the bankers. They get their two millions, for instance, out of this Chinese loan, peddle out the bonds and THEIR risk is ended. It is pleasant for the Chinese gentlemen temporarily in authority. They get the eight millions, which melt. What about those that buy the bonds ? They will get the answer to that later."

At the bottom, the tactics are identical with those employed to enthuse Americans into lending huge sums to the military overlords of China, and now that the American and Japanese group leaders are reluctant to advance these funds to bolster up any particular clique and prolong internal strife, the activities of the loan promotors have been transferred to London. It is possible to completely deceive the public in England as to the real conditions in China as it was in America, provided the boomers are sufficiently high placed and there are newspapers of prestige to publish their

propaganda. Despite the warnings of this publication, the American manufacturer, merchant and investor disregarded its advice and poured into the *Eldorado of the Far East*, and got beautifully trimmed. It cost American firms about $50,000,000 to learn that the China market is no place for unsophisticated griffins. Let us hope that the British trader and manufacturer will not get stung to the same extent, in order to learn an elemental truth that any old retired "China Hand" in London can tell him about.

Our experience in China tells us that British interests are remarkably well served and advanced by the firms already on the ground, and if they have failed to obtain their full share of the orders, it is because of conditions over which they have no control. If British trade, especially in the engineering lines, has declined, it is traceable to the increased activities of Americans and Germans, not to mention the inroads that the Swedes, Czech, Swiss, French and other European manufacturers have made in a market in which before the war they were prominent by their absence. There now exists a fierce competition for the little business that is offering, and at times the British have been unable to meet this new situation. It is futile to assert, as some British writers are now doing, that Americans and Germans have better equipped men on the ground, as we can point to a long list of British machinery firms whose engineers are fully as efficient as their competitors, in many cases experts in their lines, which, added to a long experience in China, gives them a decided advantage over the purely technical representatives of other nations.

In other words, British trade in China has not declined because of inadequate representation or inferior engineering intelligence, but simply because development has been retarded and brought to a standstill as a result of internal political conditions and the chronic inability of the Chinese government to meet its obligations, let alone embark in new construction. Whatever new business has come forward, has, in the majority of cases, gone to their competitors, who are now sitting on the door steps of the Treasury at Peking dunning the minister of finance for payment, while their respective legations are employed as official schroffs. The trade returns may alarm the British analyist who accepts the statistics at their face value, but when permitted to look behind the scenes, he well see that the apparent British loss is in reality a clear gain. They are that much in pocket.

It might also interest British engineering firms and throw light on the situation, to learn that their Chinese railway supply business has diminished in part through the failure of the Chinese government to live up to the spirit of its loan agreements with the British and Chinese Corporation, whose services as purchasing agents have been dispensed with, and in some cases, the business placed through an American firm. All of which may have been strictly according to the literal meaning of the loan agreements, but the British official company certainly was entitled to the preference in this matter, whenever the Chinese elected to make use of an agent for the purchase of materials on the lines involved. Several very emphatic protests were lodged by the British and Chinese Corporation and by the British legation against this ignoring of their rights, but as usual, they received no attention. As much of the equipment that might possibly have been ordered from British manufacturers is still unpaid for, there may be some small modicum of satisfaction in contemplating a loss of business under such circumstances. The London office of the British and Chinese Corporation might throw some light on this matter for the benefit of British engineering groups who feel uneasy over their prospects in China, and turn dejection into gladness.

British Trade With Japan

As in China, so in Japan. The same arguments are employed in the British press to explain away the loss of their trade with Japan in engineering supplies. A typical article of this nature is found in the editorial columns of *The Engineer* of October 13 ulto. The facts surrounding the situation are set forth as follows :

"If any English engineer will take the trouble to turn to a report on the commercial, industrial and financial position in Japan in the year ending June 30, 1921, recently issued by the department of overseas trade, he will be struck by two facts of much consequence to himself. In the first place, he will perceive that whilst in the years immediately preceding the war the United Kingdom supplied Japan with 40 per cent. of her requirements in iron and steel, in the year 1920 the proportion had fallen to 23 per cent. On the other hand, America in the same year increased her 15 per cent. to no less than 75 per cent. of the total requirements of Japan in iron and steel in the same year. That is a striking and uncomfortable contrast which cannot be lightly explained away, for it is confirmed by other figures for the total commerce of Japan with foreign countries. Before the war the United Kingdom enjoyed 31 per cent. of that trade and in 1920 that figure had not altered, but the United States, which used to stand second with 22 per cent., had advanced to the first place with 33 per cent. This increasing influence of America in the trade of Japan is the first fact that will strike the reader. The second is that at the time this report was written the influence of Germany was so small that it receives no attention at all—there is no mention whatever of the efforts of the Germans to re-establish their trade with Japan. At first sight, this might appear to be a matter-for congratulation ; but it is, indeed, just the opposite. Germany is now energetically at work in the Far East, with the result that we have not one active competitor to face, but two. In China the same competition has to be met. The position of the United Kingdom is no longer unchallengable. The United States and Germany are making every effort to undermine it, and nothing but a campaign carried on with all the energy we can command will prevent the repetition in China of the condition exhibited by the figures for Japan which we have quoted above."

In seeking for the causes of a state of affairs which gives rise to British uneasiness, *The Engineer* is inclined to give undue prominence to the current criticism that British engineers are not up to the high standard of efficiency and deportment that characterize their competitors, and concludes by saying that :

"If British firms neglect this policy, if they leave it to America and Germany to be represented in China and Japan by the best men, if those countries become habituated to turning to our rivals for technical help, then we shall unquestionably see a trade, which has already sadly fallen, diminish further, and the splendid reputation for engineering which this kingdom has enjoyed in the East will dwindle away."

It is with no desire to be controversial that we inject ourselves into a discussion that is purely a British family concern, but we feel warranted in inviting the attention of British engineers to the working of a fundamental economic law which seems to have been overlooked in seeking for the reason of their trade decline with Japan. It is axiomatic that a manufacturing nation who consumes the larger part of the exports of another nation is in the most favorable position to supply its imports. This explains why British machinery has been displaced to a large extent by American equipment in Japan. The world war brought great changes in old established trade conditions, and as a result America and Japan were brought into a very intimate commercial relationship. To quote the above figures, America's total trade with Japan in 1913 was only $150,000,000 : in 1921, it reached $550,000,000. American imports from Japan in 1922, largely raw silk, approximated $300,000,000 while our exports to Japan, largely raw cotton, were valued at $245,000,000. In the interchange of these staple commodities, Japanese firms to the number of seventy, established offices in New York city, with all the most up-to-date commercial machinery to assist them. Six Japanese banks, several insurance companies, and steamship lines, a special financial agent of the Japanese government, purchasing offices of the government railways, the army and navy departments, the South Manchuria Railway and other concerns have established offices in New York city. It is natural that they should place their orders for machinery and other requirements in the country whose trade makes these purchases possible. For instance, as noted elsewhere in this issue of The Far Eastern Review, the great Mitsubishi firm alone purchases annually over $50,000,000 of American products through their New York office. It is difficult to change this situation as the mainstay of their business is the buying and selling of the two great staples. The rest follows naturally. The situation is somewhat similar to that which gave to British trading firms their pre-eminence in the Chinese engineering field. The prosperity of old established hongs is based primarily on the interchange of staple products and their engineering departments were built up on this solid foundation of trade which enables them to weather through when other engineering concerns are hard hit. As long as this close trade relationship exists between Japan and America, it seems natural that American machinery manufacturers will remain in the most favored position to supply Japan with the greater part of her engineering requirements. The perfect understanding that

exists between Big Business in both countries will undoubtedly strengthen the bonds of friendship as the years go by and make it increasingly difficult for other nations to compete. The foregoing explanation will help also to explain why the principal financiers and captains of American industry determined in 1919 to use all their influence to check the agitation to precipitate war between the two countries.

These, therefore, are the basic reasons why British engineering trade with Japan has decreased from 40 per cent. of the total in 1913 to 23 per cent. in 1920 and why America increased her 15 per cent. to 75 per cent. of the total in the same period. It is no reflection on the quality of British material or the ability or social qualifications of their engineers. The British engineer in Japan is simply up against the operation of a fundamental economic law that no amount of propaganda can offset. On the other hand, it speaks volumes for British enterprise that their agents and engineers in Japan have been able to secure some of the most valuable orders in the face of a situation which gives to their American competitors such a favorable advantage.

If the bulk of the business has gone to the United States, it should be borne in mind that the great majority of these orders are placed direct with American manufacturers through the New York offices of the large Japanese firms, who, by reason of their huge purchases, intimate connections, and knowledge of market conditions are enabled to obtain the lowest possible prices and assure quick dispatch and facilitate financing. When viewed from this angle, it would indicate that at least fifty to seventy per cent. of the engineering business of Japan is of a nature that precludes general competition on the ground and automatically sends the inquiries and orders to New York. This also a situation over which the British engineering representative in Japan has no control.

G. B. R.

The Fatuous Policy of the Chiaotungpu

(Contributed)

THE Chinese government official has always been credited with a somewhat superior skill in the conduct of machiavellian policy and with a thorough knowledge of the psychology of the hapless "stupid people" under his control. If this is still a general rule, the officials now responsible for the railway policy of the government are most woaful exceptions. In the recent labor troubles they utterly discredited the one government department able to boast a policy not entirely opportunist.

In the past, this department learnt a costly lesson in the futility of listening to popular clamor raised in defence of national integrity over the question of the Hangchow-Ningpo railway loan. With the streets of Peking and their bigger cities furnishing occular evidence of the degradation of Russia as a result of the adoption of Bolshevist ideals, the railway officials now yield to a mob infected with the same dangerous principles, and making demands which will have consequences infinitely more far-reaching.

Labor so abysmal in its ignorance was bound to misinterpret an easy victory, as the Chinese official of experience was well aware. Compromise is the immemorial basis of settlement of all disputes in the East, and demands are framed in expectation of it. Yet no attempt was made at compromise. Labor's demands were conceded practically *en bloc* with the inevitable result that more demands will be made. Such a victory teaches nothing, and only breeds arrogance in the ignorant.

As a result, the government which should do its utmost to encourage and protect private industry, has involved the employers of North China in a labor war which threatens their existence. The government, already sufficiently harrassed financially has now to meet a vastly increased expenditure as a result of granting these ridiculous demands. Lastly, such a policy can only end in bankruptcy and control of the railways by foreign creditors, a result doubtless to the benefit of the nation as a whole, but entirely opposed to the ideals of a government always highly sensitive on the subject of national integrity.

On every count, domestic and foreign, the recent policy of dealing with Chinese labor was utterly mistaken. A parade of the forces of law and order, insistance upon immediate return to work with a promise to consider the grievances as represented by delegates, imprisonment for the agitator, who, not from conviction but for a price, teaches a people mentally blind, as yet, to cry for a moon they cannot even see ; these should have been the measures adopted for calming the first outbreak of industrial unrest in the North. Had these expedients failed, as assuredly they would not, there remained the application of armed force for the intransigeant minority who would ruin China far quicker even than the rival oligarchies, and their hordes of drone soldiery. The only satisfactory aspect of the present situation is that China is industrially an infant, and may perhaps, as a result of this colossal blunder, advance a step in that hard school of education to which national conceit condemns her. There is, however, even a doubt about this, for China's memory for the really vital, and educative pages, of her history is about as short as her memory for monetary or moral obligations.

Apart from this vital question, there is an apparent slackness in the conduct of the railway department of the board of communications. Presumably those who direct its affairs fail to study the very comprehensive report, the yearly *chef d'œuvre* of the department. If the statistics for the years 1916 and 1919 are contrasted they will provide unpalatable reading for those who stridently aver that China has now reached a stage of self-sufficiency in all things. During the four years considered, the annual increase in kilometreage was 134 kilometres. This in itself, is a singularly poor record for a country whose existing main lines are in urgent need of development, quite apart from the crying need of better communications generally. Such building as is done gives no indication of a systematised development of the trunk system ; there is no yearly program, not even the farce of its discussion. Years of war and lack of funds, will be advanced in extenuation, but surely with a surplus running as high as 30 million dollars, something may be snatched for systematic construction not limited by the strategic ideas of tuchuns or the official with capital to invest.

Again, it will be found that train density in the years considered has remained stationary at 11. Therefore the added kilometreage should call for no practical increase in personnel as regards the traffic and locomotive departments. The engineering department, taking the very high figure of four men per kilometre, would account for an additional 2,160 men for the 540 kilometres increase in the four years considered. Yet it will be found that the number of railway employees increased by 13,794 in the years 1916 to 1919. The railways are then in need of the economising axe, most urgent in these lean years. It might be advanced that increased rolling stock demands an increase of employees, but wagons per kilometre in 1916 stood at 1.92, in 1919 at 1.88, while locomotives were 0.116 and 0.115 in these two years, a condition indicating a practical *status quo*, and at the same time advertising the poverty of equipment as contrasted with railways elsewhere in the world. Thus two of the Indian railways were equipped in 1918 as follows, and they carry a rather less tonnage than the Chinese lines :—

		Engines per k.m.	Wagons per k.m.
Bengal Nagpur..	..	0.17	5.0
Bombay Baroda	..	0.18	4.4

Again, for the benefit of those for whom figures have no appeal, and for those who will have it that statistics may be made to prove anything, I would present the following facts. At two ports in Northern China may be seen piled up in the manner of a railway accident the parts of some four hundred cars. These have lain there at least a winter and a summer, detained, it is said, for non-payment of duty, more probably deposit default to the makers. Originally, these parts were in packing cases. The cases, however, have a past and a future as fuel, while local brass founders and blacksmiths will surely not overlook the more portable plunder in these forgotten and unprotected heaps. With the urgent need for rolling stock, what can be said of railway management which allows such things, especially when it is considered that every ton of car capacity in these dissolving rusting heaps, is capable of earning a yearly income of at least 168 dollars per annum.

Again, as applied to the question of improved communications generally, it is pertinent to ask whether any steps have been taken to metal the 800 odd miles of roads presented to the country by the American red cross, or whether these have been left uncompleted to the tender mercies of the Chinese country cart which will rapidly deprive them of potential utility. Also, in this connection, one wonders at the apathy of a government which still abandons to almost yearly inundation a considerable portion of northern Anhui for lack of reclamation and conservancy work of the Huai River, which in the long run, would prove a source of income.

It would thus appear that the publication of expensive railway reports only serves at present to lay bare ineptitude, and to demonstrate the fact that revenue is increasing at a somewhat greater rate than extravagance; a fact worthy of consideration to a government in pressing need of money.

Reverence for the past and its traditions is accounted a national trait. Those now controlling the board would do better if they turned again to the old wisdom for guidance as set forth in such pithy proverbs as: "The error of one moment becomes the sorrow of a whole life." "Those who cannot be unheeding sometimes are not fit to rule."

Something of mob psychology might have been learnt from the following sayings:—

"A vacant mind is open to all suggestions as the hollow mountain returns all sounds."

"Better be a dog in peace than a man in anarchy."
"To obtain one leads to asking for two."
"Good fortune is a benefit to the wise; a curse to the foolish."
"To stop the hand is the way to stop the mouth."

Lastly, for the benefit of the iconoclast young man who tends more and more to assume responsible positions in the government, I would quote, "who swallows quick can chew but little," and assure him that the present conduct of affairs will not bring about that eminently desirable state which is summarised in the saying "no duns outside, no doctor within." In mitigation of their undoubted deficiencies, it may be advanced that the Chinese cabinet minister is no sooner in the saddle than he is out of it that he is blinded and deafened by the perpetual crash of falling ministries and the bustle of their re-constitution. Then let him hearken to the hoary old saw which decrees that "The onlooker is often the best judge of a game." There is criticism enough in all conscience. The past has provided adequate guidance and this wisdom is in the mouth of every educated Chinese. Long live the past!

Vast Water Works Extensions in the Far East

Manila and Singapore to Increase Water Supply

IN line with harbor and public utility improvements throughout the Far East, the expansion of existing water works is being taken up in all the principal cities of the Orient. From Tokyo to Singapore plans are being drawn for large water supplies for the various important centres and the near future will see several large projects sanctioned and started. In our October number appeared articles on the Osaka and Hongkong expansion schemes and we have since received reports on the programs for the extensions of the Manila and Singapore water supplies.

The Manila Project

The urgent necessity of an increased water supplur system for the city of Manila was forcibly brought out by A. Gideon, manager of the metropolitan water district, at the weekly luncheon of the American chamber of commere of Manila on Wednesday, October 25. Mr. Gideon has been connected with Manila's water supply and sewer systems for 19 years and is the father of the metropolitan water district.

Mr. Gideon briefly traced the development of the Manila water supply system. About 200 years ago a Spanish general by the name of Carriedo left P.10,000 in a trust fund to be used for water supply purposes. By 1880 this fund had grown to P.200,000. despite the serious drafts that had been made on it by none too scrupulous people. A project was finally decided upon after ten years of investigation and it was found that it would cost P.1,200,000. To raise the extra money a tax on milk was instituted. Finally the pumping station at Santolan was installed with two pumps. When the Americans came, two more pumps were added. This system yielded 5,000,000 gallons daily, but was soon found to be inadequate.

In 1900 the city of Manila utilized its whole borrowing capacity of P.8,000,000 and constructed the present water supply and sewer system. This system, with its dam at Montalban, should be capable of impounding an immense quantity of water, theoretically, but, unfortunately the limestone of the reservoir basin is leaky and two years after the reservoir was filled up a leakage of 27,000,000 gallons a day was discovered. Since then many of the seams have been tightened up and other remedial measures have been taken, so that the loss has been reduced to 9,000,000 gallons daily.

Mr. Gideon stated that he has been urging a new source of supply since 1911. In 1918 he went direct to the governor general and outlined the metropolitan water district, so-called because it is not only designed for Manila but for all the neighboring towns. In 1919 the district was established. Up to then the water supply had been run at a nominal profit but at an actual loss of between P.250,000 and P.500,000 a year, the discrepancy being due to faulty accounting methods. The district had no funds in the treasury at the start. A credit of P.500,000 was, therefore, authorized for operating expenses. This money was not touched and there is P.1,000,000 in the treasury tô the credit of the water district.

Mr. Gideon maintained that the number of water services is an accurate index to the prosperity of the city. He presented the following figures in this connection:

Year	*Services*	*Income*
1903	2,000	P.200,000
1918	8,000	625,000
1922	14,000	1,250,000

Mr. Gideon was very emphatic in his advocacy of a new system and declared that he hated to contemplate the possibilities of the

next dry season or the one after that unless additional provision for water is made.

Three projects, he said, have been under consideration. The first is the development of the present Montalban reservoir. This, however, is impracticable on account of the impossibility of making the basin watertight. The second, in the Boso-Boso watershed, would require the construction of two large dams and the building of a new pipe line. Its costs would be about P.13,000,000. The third, and the one most favored, is that of the Angat river in Bulacan province. It would necessitate the construction of a low dam, only 50 feet high, and the water would be brought to the city by tunnel. The capacity of this project would be 80,000,000 gallons a day, which ought to take care of Manila's needs until 1980, according to Mr. Gideon. Manila is using about 2,000,000 gallons a day now. Mr. Gideon has worked out a practicable financing scheme for the Angat project. He is opposed to a hydro-electric development proposition in connection with the latter on account of its excessive cost.

Although this proposed extension is still in the air, there is little doubt that necessity will compel the adoption of some plan in the near future which will assure to Manila an adequate water supply.

Gunong Pulai Water Scheme, Singapore

At meetings of the Singapore municipal committee No. 6 held on October 9, 13 and 18 it was resolved to recommend

(A) That Sir Alexander Binnie, Son and Deacon's report on the Gunong Pulai water scheme for supply of 6½ million gallons per day be adopted.

(B) That Sir Alexander Binnie, Son and Deacon be appointed consulting engineers for design and construction of the scheme at a fee of £97,500, covering a period of six years from date of furnishing of drawings and specifications, the said firm undertaking to keep one of its partners in residence in Singapore.

(C) That the commissioners agree to Col. Pearson, engineer-in-chief, ante-dating the termination of his agreement with them from November, 1923, to August to September, 1923, with a view to his entering into partnership with Sir Alexander Binne, Son and Deacon and to his undertaking on behalf of that firm the duty of consulting engineer in residence.

This scheme as noted above, will produce 6,500,000 gallons of water per day at a cost not greater than £1,650,000, and we find here a duplication of the difficulties surrounding the colony of Hongkong in securing an adequate supply of water within the confines of its own island. As Hongkong is forced to seek its future supply from the main land and have it piped under the harbor from Kowloon, so Singapore must also go across the Johore Strait for its water, and for this reason the Gunong Pulai scheme is recommended as the only solution to Singapore's problem.

Commenting on this scheme, the *Malaya Tribune* says that "Such an increase looks substantial, but let it be remembered that the present position is "precarious," and that within quite recent memory an unusually prolonged absence of normal rainfall brought a water famine within uncomfortable distance. Actual daily consumption in 1921 was 10,057,000 gallons, and that quantity was in excess of maintainable yield from existing sources. In other words, shortage of supplies was only averted by a providential rainfall which it was not safe to count upon.

Turning to the future—and remembering that over ten million gallons were consumed daily in 1921—let us consider the prospects. Basing conclusions as to increase of population and of water consumption on calculations which experience has shown to be reasonable, by 1951—29 years from now—three will probably be a population within the Singapore water area of 658,200 (compared with the 333,266 of 1921); that is, the population will have nearly doubled. Allowing 35 gallons of water per head per day, the consumption will then be 23,037,000 gallons daily; allowing 40 gallons per head, it will be 26,328,000 gallons. And whilst Colonel Deacon thinks that 37 gallons is a sufficient daily allowance per head of population (the 1901 figure was 21.7, the 1920 figure 32.9), the points out that the increase shown in the past few years is due both to greater domestic use and to trade development.

With the Gunong Pulai supply duly available—and Colonel Deacon insists upon the urgency of commencing operations to make it available as soon as possible—"there need be no anxiety for many years to come"; and his opinion that this is the most economical of the several schemes put forward commands respect.

* * *

Looking Ahead a Quarter of a Century

Russo-Germanic Designs in Europe and Asia

ONE of the most influential publications of the United States is *The Manufacturer's Record*, of Baltimore. It reflects the sentiment of the great commercial and industrial interests of the Southern States, whose prosperity is closely interwoven with that of the great British textile industries. After reproducing the gist of the editorial entitled "Up to Northcliffe," published in the July issue of THE FAR EASTERN REVIEW, *The Manufacturer's Record* says:

"*The North-China Daily News* has an uncanny habit of unearthing documents disclosing the inner working of Russian policy in Asia. Many years ago it set the chancelleries of the world agog by publishing the text of the Cassini convention, a document which changed the whole aspect of Asiatic politics and compelled Great Britain to move quickly in order to defend her interests in India and elsewhere in Asia. The aftermath of this convention and its corollary, the Li-Lobanoff secret alliance between China and Russia, was the Anglo-Japanese alliance, the Russo-Japanese war and the series of events which culminated in the twenty-one demands followed by the diplomatic blunders which nearly precipitated war between Japan and the United States.

"Once again our contemporary publishes an epoch-making document, purporting to be the full text of the secret military convention between Soviet russia and republican Germany. As in the case of the Cassini convention, the authenticity of the document is in doubt, but it bears the earmarks of truth. In the event of its authenticity being established, history will undoubtedly repeat itself and Great Britain again make quick moves to counteract it, and unless we are greatly mistaken, the first of these will be a renewal of her discarded understanding with Japan.

"By the terms of this secret agreement, Germany will equip, arm and entirely reorganize the Russian army. The German general staff will furnish the red army with the latest inventions in poison gas warfare, will build and equip new munitions and air craft factories, *and the reds are not to interfere with the work of German officers and specialists on the new munitions factories on the border of Afghanistan.*

"No competent observer can fail to see that the reported secret convention is the logical aftermath of the Soviet's first surrender to Germany, and is strictly in line with the news that has dribbled out of both countries for the past three years."

"The information given in the foregoing from THE FAR EASTERN REVIEW is now confirmed by dispatches from Europe, which show that not only have Germany and Russia entered into a treaty, but that Tu key is included in the deal."

"Mr. Moreton Frewen, the well-known political economist of England, sends the *Manufacturer's Record* an interesting letter from Lieut.-Colonel Repington in which attention is called to the fact that the Russo-Turkish alliance of last year has been followed by the Russo-German treaty, and that the known tendencies of Austria, Hungary and Bulgaria compel England to recognize the solidarity among its lately vanquished enemies, and a clearly defined intention of bringing about by successive stages the revision if not the destruction of the peace treaties with the aid of the Soviet government of Moscow."

"Colonel Repington says the Bolsheviks, prompted by Germany, and the Kemalists in second place, recognized early the leverage which they might exercise against the western powers by an appeal to Mohammedan sentiment throughout Mohammedan regions, and they left no stone unturned to excite against England, France and Italy, the Mohammedan people under their sway. The propaganda has been carried on for three years in the allied countries or their dependencies, and everywhere in the underground workings has been seen the hand of the Soviet.

"The Germans wish to bring back the Turk into Europe in order to revive for their benefit the old war combination. The Turk once in Europe, the designing Germans, as admitted by Von Sanders, count on the 26,000,000 Mohammedans of the world to keep the western allies fully employed in protecting their own possessions.

"It is not," says Colonel Repington, "a program for to-day or to-morrow, but for a quarter of a century ahead."

"The congress of Oriental peoples which is to meet next year under Kemalist patronage is part of the picture and it will endeavor to unite all the Orient against the west in a common front, a consummation to which the Germans are looking with great satisfaction. Turkey is to serve as a link between Germany and the whole of Asia. Turkey can count on Russian support as Russia can count on Germany. Those who have traveled through Eastern Europe of late find the indications of this great conspiracy wherever they go."

"Colonel Repington's letter illustrates in considerable detail the meaning of this situation to England and France, and no American study the outlook without feeling that the world is coming to a parting of the ways between civilization and barbarism, and the struggle will be whether barbarism or civilization shall survive.

"One of the best informed and most far-seeing educators in England in a personal letter to the editor of the *Manufacturer's Record* says: "Things are moving on apparently to a vast cleavage between the Christian and Mohammedan worlds. I wonder if Americans know the appalling things that happened at Smyrna. The Turks are just raging to get over the Bosphorus and get after Christians."

"Lloyd George in his address rightly stated the case when he said that England had stood in the breach to save Europe from the onrush of the Turks. Standing thus England has perhaps for the time being saved all European civilization, for if once the Turks can re-enter Europe in power, the rise of the Mohammedan world against Christianity will stagger the world with the awful carnage, of which only the barest hint seen in the destruction of Smyrna. What the Turks did to that city and to the tens of thousands of Christians gathered there, they are longing with a blood lust to do to all of Europe.

"The Almightly alone can see what is ahead of the world, but in the light of this situation disarmament of America or of England would be a crime against humanity and Christianity itself."

* * *

Will Wood "Come Back"?

THE elections on November 7 may be considered as a republican defeat, a disapproval of the present administration forcibly expressed by the American people. It is doubtful whether this reaction is traceable to the republican party's handling of domestic problems or to its foreign policy. The democrats, arraying themselves for the struggle in 1924, have fiercely attacked the foreign policy of Harding and Hughes characterizing it as "supremely foolish" and "a record in foreign affairs of almost unparallelled stupidity," basing their denunciations largely on the failure of the present administration to enter the league of nations. The democrats say that "two years ago the moral influence of the United States was supreme in the world: it was universally recognized that the United States had entered the world war for altruistic and not selfish motives. With the election of Mr. Harding that influence was withdrawn." According to the democratic arraingment "the recrudescence of the militaristic spirit in some quarters of Europe, the existence of large armies, the difficulties of the reparations question—all these things, with their inevitable blight upon the trade of the world, are the direct results of the foreign policy of the present administration."

It begins to look as though the democrats will drag the league of nations issue into the next campaign and lay to the door of the republicans all the woes that have befallen the world and the United States for Harding's failure to adopt the policies of Wilson. The democrats overlook the all important fact that although the last administration may have settled the affairs of Europe to its own satisfaction, it was committed to a program in the Pacific, taken adrantage of by international mischief-makers, which would have plunged the nation into war with Japan.

From this horror the republicans have saved the country and permitted it to retain the leadership in world affairs. We may have lost a certain amount of so-called moral prestige because of our refusal to play the rôle of Don Quixote, but on the other hand we would have emerged from a war with Japan bankrupt in finances and once more in a position where our moral leadership would have carried little weight amongst nations whose policies are diametrically opposed to our own. Our moral prestige would not have carried us far in the councils of the league of nations were we shorn of our financial supremacy and the power to back up our opinions. That the United States is still reckoned with as the strongest power in the world is due, not to the Wilson administration, but to the common sense of the republican leaders shouldered with the task of finding an honorable solution to Pacific problems inherited from their predecessors in office.

We give full credit to Harding and Hughes for the admirable manner in which this solution was sought and applied at the Washington Conference, but we also incline very strongly to the belief that their success was made possible in a large measure by the full and frank conversations between General Leonard Wood and the Japanese military leaders in Tokyo in which each side made known their irreducible terms of compromise. Harding and Hughes are entitled to the credit for this great epoch-making event which brings peace to the Pacific, but nevertheless, it was the cold, hard, manner of fact talk between fighting men seated around a table which made its success possible.

Affairs in Eastern Asia are rapidly approaching a crisis.

Leonard Wood has already done great work in the short time he has been in the Far East. He will be called upon to do greater things before his mission in the Philippines is completed.

* * *

Japanese Sewage Systems

OWING to unusual local conditions, the cities in Japan have been slow in arranging for the installation of sewage systems, but reports coming to hand now indicate that Japanese cities will follow occidental practice in these matters. The Japanese premier has approved the proposed program for sewage improvement for Osaka. This sewage system will handle both rain water and foul water, conducting it to cesspools, which will be fitted with pumping equipment to discharge the whole into rivers or canals connecting with the sea.

The problem involves a very considerable installation, which has been carefully designed and involves the placing of pipes, the construction of cesspools, and the installation of pumping equipment. It is anticipated that 40 per cent. of this work will be done in the Japanese fiscal year 1922, a further 40 per cent. in 1923, and the work completed in 1924.

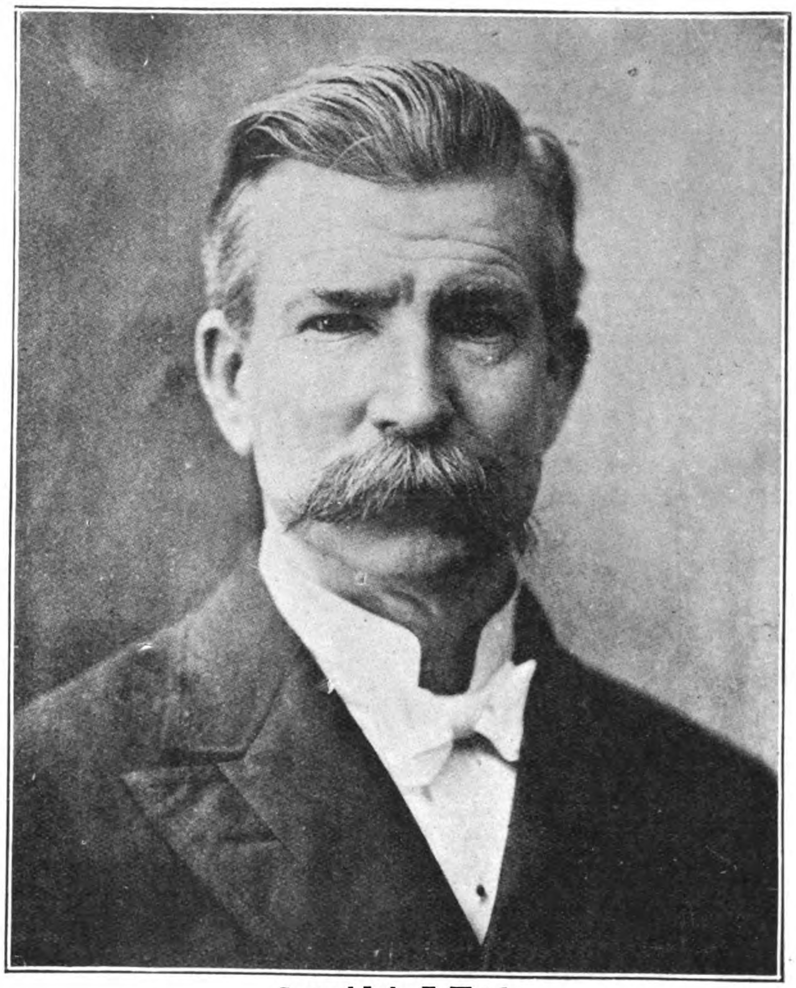
In Memorium

General Luke E. Wright

"The Father of THE FAR EASTERN REVIEW"

GENERAL Luke E. Wright, ex-secretary of war, former governor-general of the Philippines and first American ambassador to Japan, passed away at his home in Memphis on November 16, after an illness of several months. The name of Luke Wright will loom large in the annals of American penetration into the Orient. When the historian takes up his task, upon no pages will his pen dwell more extensively and approvingly than upon those recording the acts of the man, who stood at the helm of the insular administration during its difficult formative stage, the target for bitter attacks from those who endeavored to prolong the " Days of the Empire "; who subsequently carried to the court of the Mikado as our first ambassador the assurance of American good-will, and afterwards filled the post of secretary of war in Roosevelt's cabinet where he continued to preside over the destinies of the islands and keep his finger on the trend of international developments in this part of the world.

General Wright gave a deep study to Philippine and Far Eastern problems, and on reaching a conclusion adhered to it during his stay in the islands. He felt that the archipelago was practically a virgen field, that the possibilities for development along commercial, industrial and agricultural lines were almost limitless. He was early convinced that the islands needed commercial, industrial and agricultural regeneration, and that a brilliant future awaited American trade in the Orient as a consequence of our occupation of the islands and the operation of the "open door " doctrine, recently proclaimed. In carrying out his basic ideas for the development of the islands and expansion of American trade and prestige in the Orient, THE FAR EASTERN REVIEW became a part of the program.



General Luke E. Wright

The liberal support tendered to this publication by the Philippine commission over which he presided made its growth possible and contributed largely to its success. THE FAR EASTERN REVIEW was founded in 1904 with the cordial support of the Philippine Government in order to give publicity to the material progress and commercial opportunities of the Philippines, to defend American aims, ideals and policies in the Orient and advance American trade in a field at that time dominated by a press, if not hostile, at least unsympathetic to our national aspirations. Much of its success is due to the initial whole-hearted support of Governor-General Wright and his successors, Ide, Smith and Forbes, over a period of years during which American firms in the Orient were conspicuous by their absence, and there were no commercial attachés, trade commissioners or chambers of commerce to carry the load of advancing national interests.

THE FAR EASTERN REVIEW has never willingly departed from the policies laid down by its original sponsors, whose sympathetic interest, guidance and confidence enabled it at all times to accurately interpret American ideals in the Orient and give a square deal to all other national interests in this complex and highly competitive field. THE FAR EASTERN REVIEW cheerfully acknowledges its debt to Luke Wright and his colleagues, and our most cherished compensation for the years of hard, uphill pioneering is the remembrance of his words of praise when last we met in Washington.

Space forbids the enumeration of the many excellent laws all tending to improve the material condition of things in the Philippines, drafted and put into force during his term of office. Always modest, self-effacing, generous, kindly and truth-loving, he will be remembered by those whose destinies were in his hands for many years and mourned by those who had the rare good fortune to work with him and be honored with his friendship. He represented the highest type of the fine, old, courteous southern gentleman; a type that is fast disappearing. The nation is the loser.

General View of Exterior

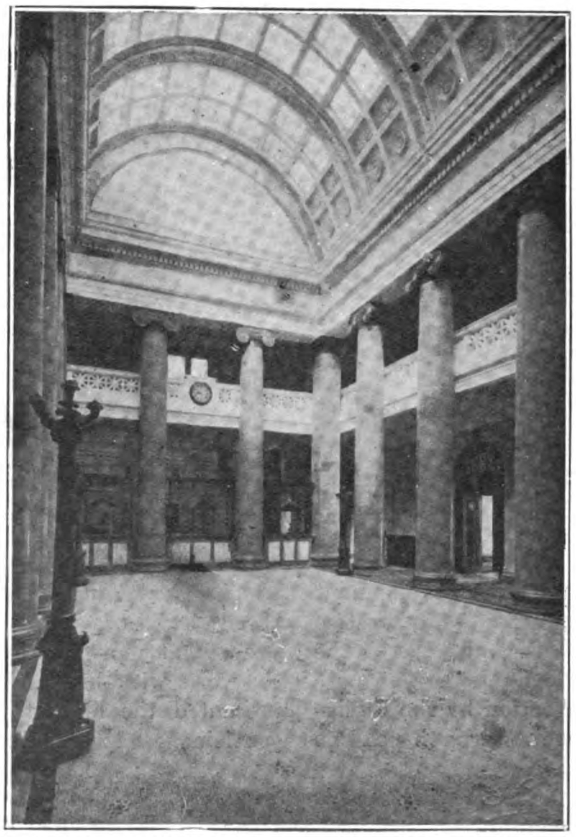
The New Kailan Building at Tientsin

THE new headquarters of the Kailan Mining Administration at Tientsin now nearing completion, is one of the finest examples of foreign architecture in China. It was designed by Mr. B. C. G. Burnett, the Tientsin representative of the well-known firm of Atkinson & Dallas, Ltd., in competition with several other architects. The contract for the erection has been carried out by Mr. Hong Mow-kee, a prominent Chinese builder of Shanghai, who has had special experience in the use of artificial stone such as is used for all the face work of the new structure.

The new offices form a rectangular pile 220 feet long and 120 feet deep with four stories aggregating some 70 feet in height, faced in artificial grey granite.

Mr. Burnett has adopted the Neo-classic style, and indicates Roman influence in the treatment of the main floor windows but, in the final plans, this has been eliminated by the adoption of square, mullioned openings, leaving the style throughout purely Grecian.

The main facades consist of colonnades Ionic columns on pedestals rising clear above the terrace, surmounted by an attic order. Boldly displayed on the main frieze is the administration's title and the year of construction in Roman numerals fashioned in bronze. The main entrance occupies the three central bays of the Meadows-road frontage and is approached by a broad easy flight of the steps in natural granite which lead to the vestibule through treble swing doors.



The Main Hall, looking towards the Cashier's Grille

All the floors and the very extensive flat roof are connected by two electrically-driven six-passenger elevators. The hot water heating is from a two-unit installation deriving its power from small boilers of the Lancashire type: the treatment of sewerage by the modern septic process; the expulsion of all waste water and sewerage by pressure through a metal pipe communicating with the river and the use of the most modern appliances for ventilation, signalling and electric lighting.

The total cost of the construction of the head offices is approximately half a million dollars, exclusive of the value of the land.

The Kailan Head Office at Tientsin: Main Entrance, Gates Open

Private Railways in Japan

PRIVATE railways operating in the country districts are becoming more and more important as feeders to the main lines of the imperial government railways. The government is to-day busily engaged in perfecting the trunk lines, and is willing to leave the building of the important lines tapping the agricultural, forests and mining centres of the interior to private enterprise, which in the long run, as they prove profitable to their initiators, will be nationalized.

Between 1911 and 1921 the length of private railway lines, excluding double tracking, increased 200 per cent. The capital invested in private railway comhanies in the same time increased from four to five times. Lines opened to business increased by 3½ times, and at the end of 1921 the mileage of private railways was equal to 30 per cent. of the total mileage of the national railways, the latter operating 6,728 miles, the former 2,138 miles.

Ten years ago the mileage of private railways was only 12 per cent. of that of the government railways, 605 miles against the government's 5,000 miles. The following table shows the details of the development of the private railways from 1911 to 1921 :—

	1911	*1921*
No. of railway companies	142	245
Mileage licensed	2,453 miles	4,519 miles
Lines open	605 ,,	2,138 ,,
Capital invested	Y.131,542,085	Y.632,422,255

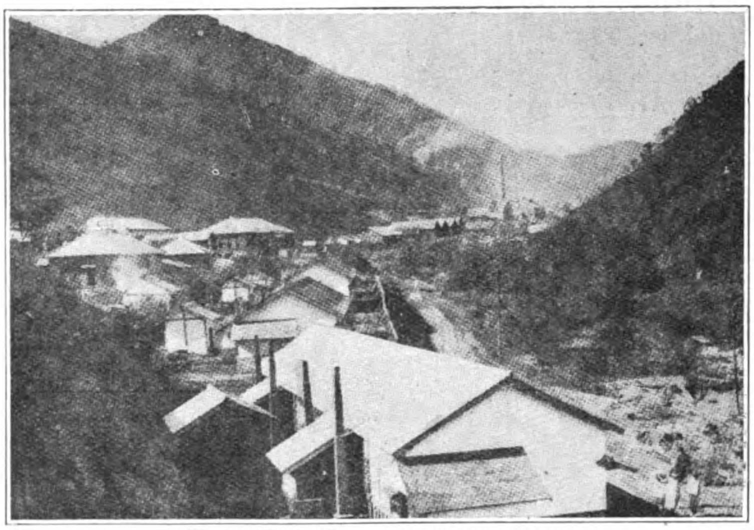
During the past ten years the quality of the equipment of the private, or light, railways has been remarkably improved. Ten years ago the railways and their equipment were distinctly primitive, and the standard of rails and carriages was very light. Costs of construction per mile averaged in 1911 only Y.5,400. to-day this cost has increased to an average of Y.140,000 per mile. Even allowing for the increased cost of all materials and labor, this great advance in the cost of construction per mile is almost entirely due to the great improvements which have been made in the equipment of the old lines, and in the higher standard of equipment adopted by each new line built. The light rails of ten years ago are practically all replaced with heavier makes, and as a result the tonnages carried by the private railways have been steadily increasing. Steam lines are to-day being gradually converted into electric power systems.

(*Continued on page 745*)

Tienposhan-Tumen Light Railway

THIS long talk of light railway connecting the Tienposhan Silver Mines with the Tumen river in the Chientao district of the province of Kirin, is being pushed to completion despite the protests of the Peking authorities who refuse to recognize the concession signed by the ministry of communications and the subsequent contract entered into whit Chang Tso-lin. Like every other enterprise in China it has encountered the stubborn opposition of the native gentry, who profess to see in it a surrender of sovereign rights to Japan and who have used every method of obstruction known to the Chinese to prevent work being started on it.

The Tienposhan Silver and Copper Mines are located in the Chientao district, ten miles southwest of Laotoukou and are operated under a concession held by the South Manchuria Development Company (Tahsing Company) a Sino-Japanese enterprise which has erected a refinery and smelter and made considerable progress in development work. In order to facilitate the transport of ore and metal to the coast, a light railway line, 80 miles in length, was projected that would connect the mines with the Tumen river. At the same time, such a line would also have an immense strategic value in the event of any attempt on the part of the reds to re-open the old issues with Japan in Manchuria, and could ultimately be made to form part of the proposed Kirin-Kwanei Railway for which Japan holds the concession from the Chinese government. Aside altogether from its economic significance, events are transpiring which justify Japan in her determination to push through the work and hold the Chinese to their signed agreements.



Tienposhan Silver and Copper Mine

The project for the construction of this line had its inception in 1915. According to the Chinese version of the intrigues surrounding the concession appearing in the *Peking Daily News*, a Japanese subject named "Fan-tien-yen-ta-lan" signed an agreement with a Chinese named Wen Lu for the formation of a Sino-Japanese company with a capital of Y.2,000,000. A set of regulations of 15 articles was fixed, and the sanction of the Chinese government obtained through the influence of Wen Lu. Investigation, however, indicated that Wen Lu was employed by the Japanese to use his name in dealing with the Chinese officials. The ministry of communications appointed delegates to inquire into the matter, and having satisfied itself with the fact that it was not a *bonâ-fide* Sino-Japanese concern, the permit was cancelled on the 23rd December, 1919. It was recognized that there was no necessity for the construction of the line, as it would run parallel with the Chi-Huei line, besides many other reasons. However, the Japanese did not stop work and last year began construction on a large scale. The Chinese again raised objections, as there was no Chinese share in the Company, and the ministry of communications again appointed delegates to investigate. It was discovered that there was not a single Chinese share in the company, and that, moreover, the mines at Tienpaoshan had stopped operations for a period of more than one year.

Fearing that the result of the above-mentioned investigation would cause them to stop construction work, the Japanese employed a certain Hsu To-yu, secretary of the Company, who styled himself representative of the Chinese shareholders, to proceed with large funds to Holunghsien and Yenchibsien to enlist the assistance of the gentry there, who have ever since been styled as Chinese shareholders and who will be entitled to a certain amount of dividends without paying a single cent for their shares. Last April the Japanese began again to construct the line, and the students and merchants at Yenchi and Holung made a demonstration during which the Chinese shareholders were severely beaten. The Japanese published false reports stating that the movement against the construction of railway was engineered by Chinese connected with the independent party of Korea. Consequently the Japanese consul demanded the extradition of these two gentlemen, who went to Peking to obtain protection and redress. In July when President Li Yuan-hung was reinstated and parliament restored, Messrs. Li and Wen began to show the cabinet, parliament, the ministry, etc., the aggression of Japanese in their native district; and the government telegraphed to Mr. Tao, taoyin of Yenchi, instructing him to come to Peking to discuss the matter. At the same time General Chang Tso-lin, who was informed of the trouble, ordered Mr. Tao not to proceed to Peking but to come to him at once. The people, knowing that there would be no good result if any decision should be made in Mukden, immediately appointed Messrs. Chang Ping and Huo Wan-chen to make an appeal to General Chang Tso-lin, requesting him to cancel the agreement made with the Japanese. But Messrs. Tsai and Tao, foreign commissioner and taoyin of Yenchi, respectively, were there before them, and were secretly instructed by General Chang Tso-lin to support the Japanese. The representatives of Yenchi and Holung were received in audience by Mr. Wang Yung-chiang, who advised them to return to Kirin where they might appeal to their own officials, as Fengtien authorities did not like to interfere with the affairs of Kirin. They at once sought an interview with their commissioner and taoyin, who informed them that General Chang had already had an agreement with the Japanese, and that probably after the cancellation of the agreement, a Japanese loan would be contracted for the Chinese themselves to construct the line. The representatives lodged a written protest with these two officials, who showed the document to General Chang, but General Chang said that he did not like to handle the business and ordered that the representatives should return to Kirin to arrange with the authorities there. They at once returned and approached Mr. Kuei, the shenchang, who told them that being a native of the province, he would not conclude any agreement with Japan. At this time Messrs. Tsai and Tao paid another visit to Fengtien, where a secret agreement was signed between them and the Japanese. The agreement consists of 14 articles and stipulates that a loan of Yen 4,000,000 should be concluded for the enterprise. The publication of the news at once aroused the indignation of the people of Yenchi and Holung, but General Chang Tso-lin threatened to resort to drastic measures should the people raise any objection against his action. Again the people sent their representatives Messrs. Chang and Huo to the capital where they interviewed various important officials on the 13th and 14th October. Both the ministries of foreign affairs and communications have started to institute investigations, and the former will

lodge a strong protest with the Japanese legation after a report is received from Kirin. The Japanese legation will be informed that any agreement signed between Japan and Mukden without approval of the central government will be considered null and void.

Notwithstanding the protests of the waichiaopu, the Japanese m nister has refused to consider it, or even to transmit the protest to Tokyo, basing his action on the statement that the contract was legally signed and ratified by a former minister of communications at Peking, and more recently ratified by the tuchun of Manchuria, Chang Tso-lin.

The formal agreement was signed by the Japanese company and the Chinese authorities notwithstanding the opposition of the ministry of communications in Peking. Furthermore, the Kirin provincial assembly declared that without its concurrence as the representative of the Kirin people, the agreement will be considered null and void; but General Chang Tso-lin says that by election of the provincial assemblies of Fengtien, Kirin and Heilungkiang, in his capacity as chief commander of the Paoan army or peace guards of Manchuria, he recognizes neither the veto of the Peking government nor the minority of opposition in the Kirin assembly, so that constructional works will begin by the concessionaire in accordance with the stipulations of the Sino-Japanese agreement which has been endorsed by the Japanese consulate-general in Mukden.

Such are some of the difficulties surrounding the most commonplace business for the development of China at the present time, but which, after all, are true to traditions and precedents.

Private Railways in Japan (*Continued from page* 743)

During the war many railway companies were unable to raise funds to build lines which had been licensed, and their licenses lapsed, but after the war there was a boom in railway building, and the boom still continues.

Tramways, urban railway lines, have also been increasingly prosperous, and since 1913 (Figures previous to 1913 are not obtainable), there has been a remarkable growth in the costs of construction per mile opened to business, although the mileage in operation has not shown a corresponding increase. The following table shows the development of tramways since 1913 :—

	1913	*1921*
No. of companies and official corporations operating tramways	124	189
Licensed mileage	1,625 miles	2,245 miles
Mileage opened to business ..	1,139 „	1,332 „
Costs of construction	Y.258,231,940	Y.933,683,450

Construction, as in the case of priva te railways, slacked off during the war. To-day, however, tramways are being constructed in all the principal centres of business, and the large cities are extending and improving their lines, the development of all the urban centres calling for large investments in better transportation facilities. Many of the cities where the tram lines are not owned by the municipality are planning the municipalization of the private lines. The city of Nagoya has just purchased the private tram lines in that growing city. To cover the purchase price a bond issue will shortly be floated. Such municipalizations are, however, difficult of realization under present financial conditions. The national government too does not countenance the issue of bonds for sale abroad. Consequently the advancement of the urban transportation facilities where capital must come through foreign investment is badly handicapped in Japan to-day.

The number of local (private) railways which received the governmental subsidy during 1921 fiscal year amounted to 51; the amount of subsidy reached Y.914,066 which was an increase of Y.293,552 as compared with the previous year. The following table gives the names of the railways, their mileage of operating lines, and the amount of subsidy :—

Names	Mileage	Amount (in Yen)
Malesuzaka Ry Co. ..	14.4	Y.1,909
Uonuma	8.1	3,355
Tateyama	13.0	6.933
Shonan	5.5	780
Yoro	35.8	65,218
Chuen	6.3	5,415
Miyazaki	12.5	14,474
Chugasa (Nakagasa ?) ..	15.7	246
Miyazaki Kenei	3.9	9,828
Odawara Denki	5.6	127,706
Ujima	10.6	19,438
Ichihata Keiben	13.0	3,781
Yokkaichi	10.2	1,019
Uwajima	11.1	· 598
Takeoka	6.0	593
Chiba Kenei	14.1	59
Ise	16.9	37.131
Anno (Yasuno?)	12.2	13,344
Akami	3.6	3,533
Onsen Denki	6.6	17,367
Nagaoka	18.8	6,877
Sutsu	1.2	46,157
Ako	7.9	13,537
Hideu	8.8	9,439
Akita	18.2	48,399
Nagareyama Kéiben ..	3.5	4,493
Shinoyama Keiben ..	3.0	4,716
Onoda Keiben	2.9	33
Awa Denki	8.7	31,136
Mihata Keiben	4.0	4,820
Arita	5.7	13,136
Osumi	15.2	4,998
Anan	6.5	7,290
Funaki	3.7	4,645
Santo Keiben	6.1	2,106
Kusatsu Keiben	22.9	34,229
Joshu	6.5	6,134
Mie..	3.7	9,546
Azumano	8.2	1,568
Ehime	16.1	78,158
Tsukuba	24.9	25,793
Yamato	6.3	10,825
Jozankei	18.6	9.315
Maruko	4.0	4,584
Nagato	11.3	3,634
Ohso	12.9	24,329
Kaetsu	4.1	15,661
Tama	4.4	26,233
Hizen Denki	6.0	26,538
Boseki	11.6	81,036
Saseho Keiben	9.0	21,571

Flour Industry in Manchuria

The flour industry in Manchuria has not been prosperous for some time, but owing to a good harvest of wheat, mill owners are very optimistic this year. There are now 46 flour mills in Manchuria with a daily capacity of about 60,000 bags (15,000 barrels). The following table shows the number of mills in the different parts of Manchuria and their respective daily output :—

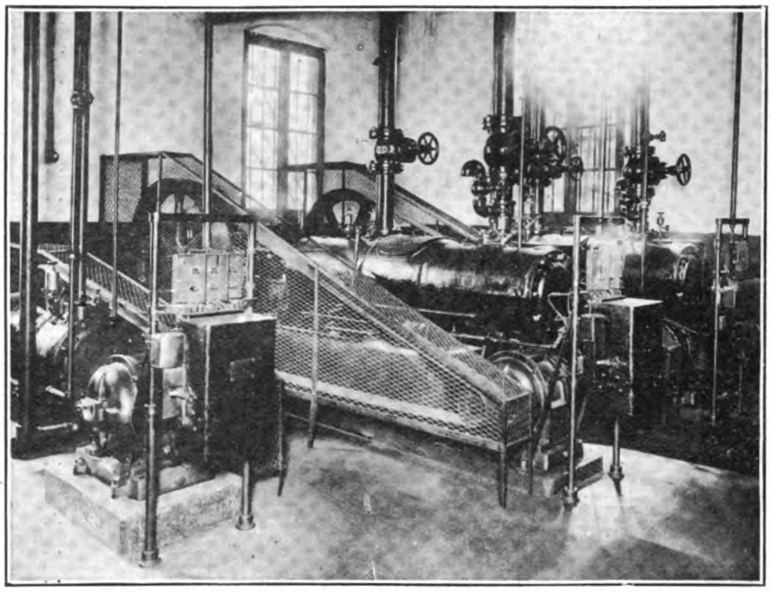
	Number of Mills	*Daily Capacity*
Harbin	23	33,150 bags
Districts along the Chinese Eastern Railway ..	5	2,150 „
North Manchuria	6	3,600 „
Manchuria, South of Changchun	12	23,800 „
Total	46	62,700 bags

American Enterprise in China

Lamp Factory of the China General Edison Company at Shanghai

AMONG the industrial achievements in Shanghai, one of the best known, is the lamp factory of the China General Edison Company.

The visitor's car brings him out from the busy business section of Shanghai, through the residential section of the international settlement out into an old-time Chinese village. One's car crowds through the jostling wheel-barrows and ricshas, skirts a dirty creek crowded full of beggars boat houses, with their arched bamboo roofs, and passes a solid block of straw thatched huts. Just beyond these straw primative hovels of the villagers, the car comes suddenly to a large open field, on the left side of which stands the red brick lamp factory, and on the right rises the stack of the glass factory. The American flag waves over the field in a way expressing the contrast between the old and the efficient business policy of America, guaranteeing quality and fairness.



Electrically Driven Vacuum Pumps and Compressor

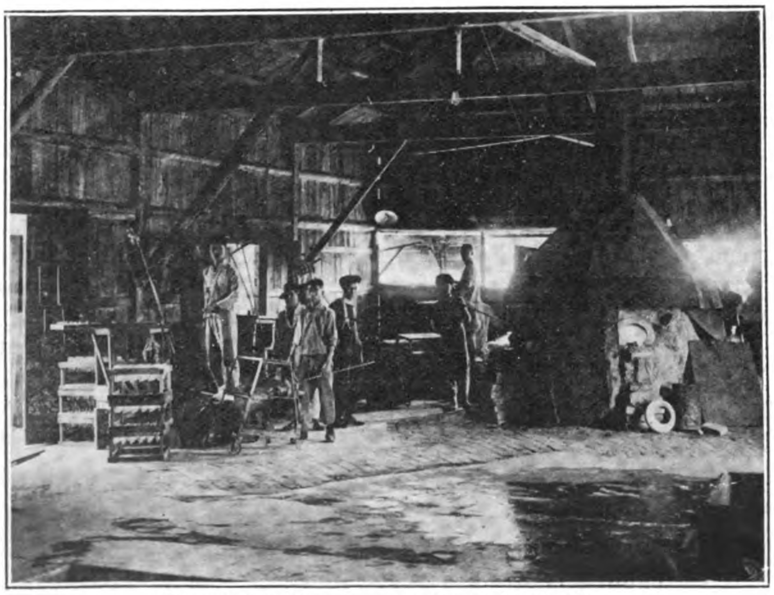
From a start five years ago this factory has grown until now the well-known G. E. lamps are produced in a factory, equipped with modern American machinery, capable of producing efficiently from four to five million lamps a year. And yet to an engineer visiting this factory, the impression is that this growth has only just begun.

In the sales office the visitor from America finds the Chinese clerks handling the same efficient system of handling orders as used in the home office of the International General Electric Company, except in so far as these methods have been modified by long experience to meet special conditions in China. American executives are in charge of this work.

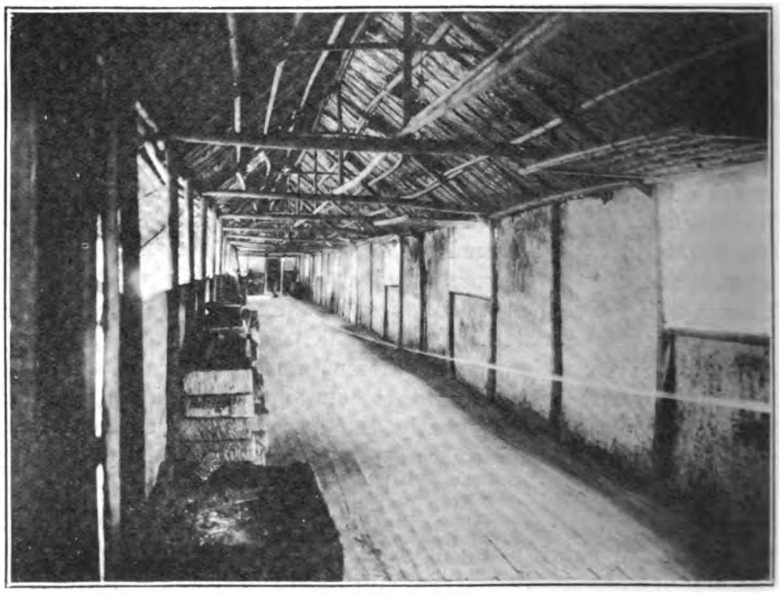
The success of the sales office, however, has been due to the quality of goods turned out by the factory. The visitor passes on quickly to the factory itself. The American manager of this factory has two convictions, to prove which he came out to China. First, that the Chinese are able to turn out a product equal to any; and second, given proper supervision and good working conditions, Chinese labor can do this work efficiently.

One chart over the manager's desk proves the first point, superior quality in the lamps—for this curve of lamp sales, showed that there was no drop in the lamp business for 1921, in contrast to the almost universal sharp decline in business in almost every other line, due to financial conditions and competition. The G. E. Edison lamps have built up the reputation of good appearance, high efficiency and long life.

Other curves hang there in the manager's office, tell the story of factory management. Those black lines on the ruled paper, picture exactly from week to week, just what the factory organization is doing. Here is one showing the total lamp production per operator per hour. Another carries the individual or average production of each process of manufacture, such as filament winding, bulb exhausting, basing, testing, until the lamp is packed ready for shipment. If the curve goes up, showing a loss, or drop in speed, careful investigation follows. In fact, unless the curve goes steadily down and down, showing increased speed and less loss, personal investigation follows. Under modern supervision the efficiency of the Chinese operators has been increased 50 per cent.

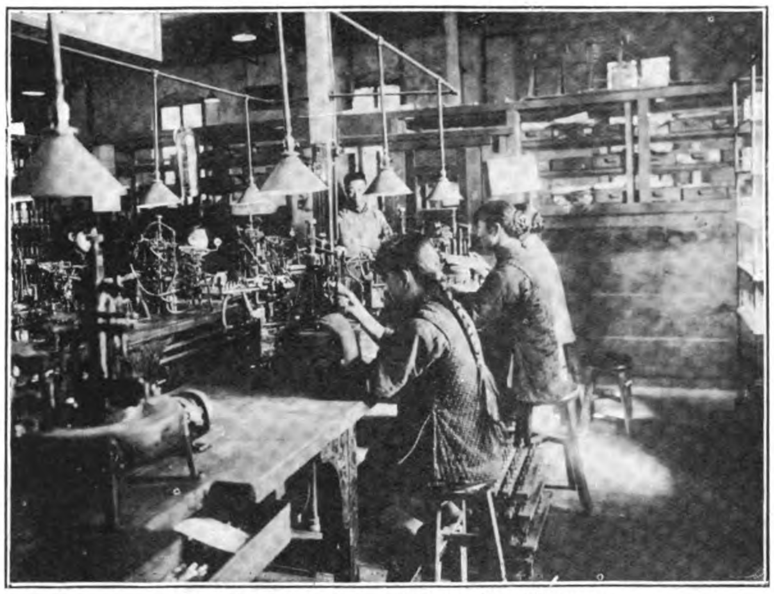


One of the Glass Furnaces for Bulb Making



Drawing a Glass Tube 125 feet long

Filament Winding Tables

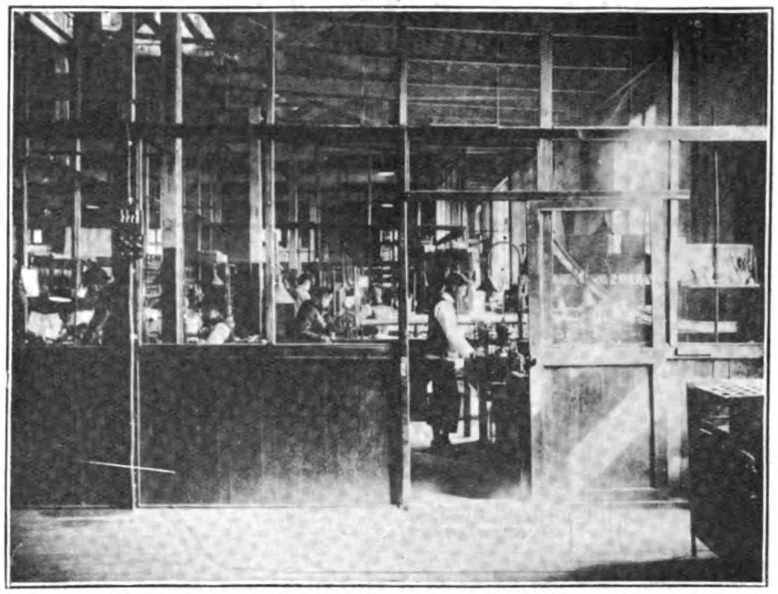


Anchoring Machines, supports for Filaments

High across these curves, there is drawn a bright red line, showing the best record that has been made by American lamp works in each particular process. Any individual operator or group of operators who make their records meet this red line, are given a bonus. Those black curves touch the red line more and more often as the weeks pass, showing that the manager's belief is being justified and that Chinese labor under proper supervision cannot only do good work, but do it efficiently.

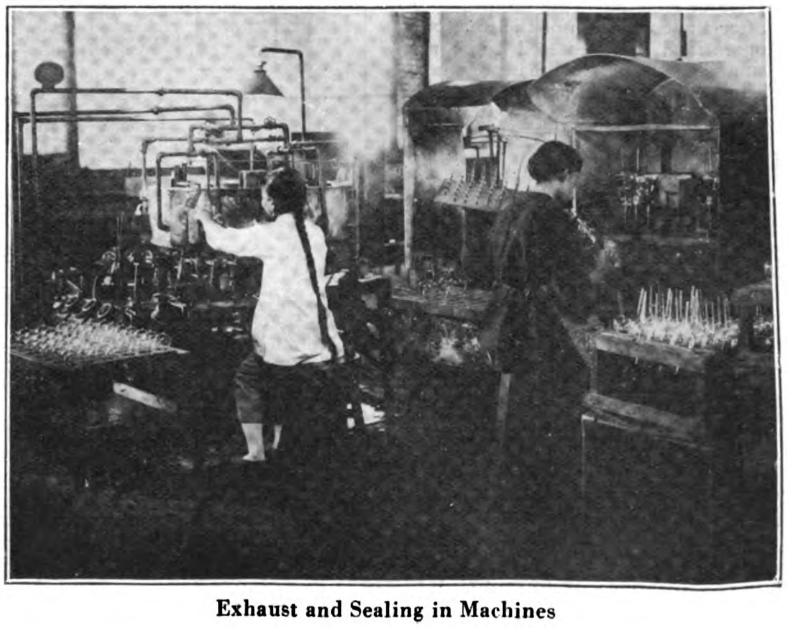
Out in the factory, this management takes on personal terms. The man in entire charge of production is an American. Under him are two Chinese engineers, who have been thoroughly trained through technical schools in America, and five years of practical experience in lamp manufacturing in the States. The remaining foremen have each been personally trained for their particular work. Of the three hundred and seven employees under these trained engineers, ninety-nine have been with the company for two years or more. Under careful supervision the employees have learned to do their work well. In the large factory room, the neat dress and the fast quiet work of the Chinese women operators at once catches the attention. The comfortable loose waist and neat pants of the Chinese women form the most ideal cloths for work. The slender flexible Chinese hand is peculiarly fitted for the manipulation of delicate parts of lamp construction. Right by the door, as the visitor goes in is the testing rack—a constantly moving circle of lamps, constantly replenished by the operator, with lamps to be

(*Continued on page 756*)

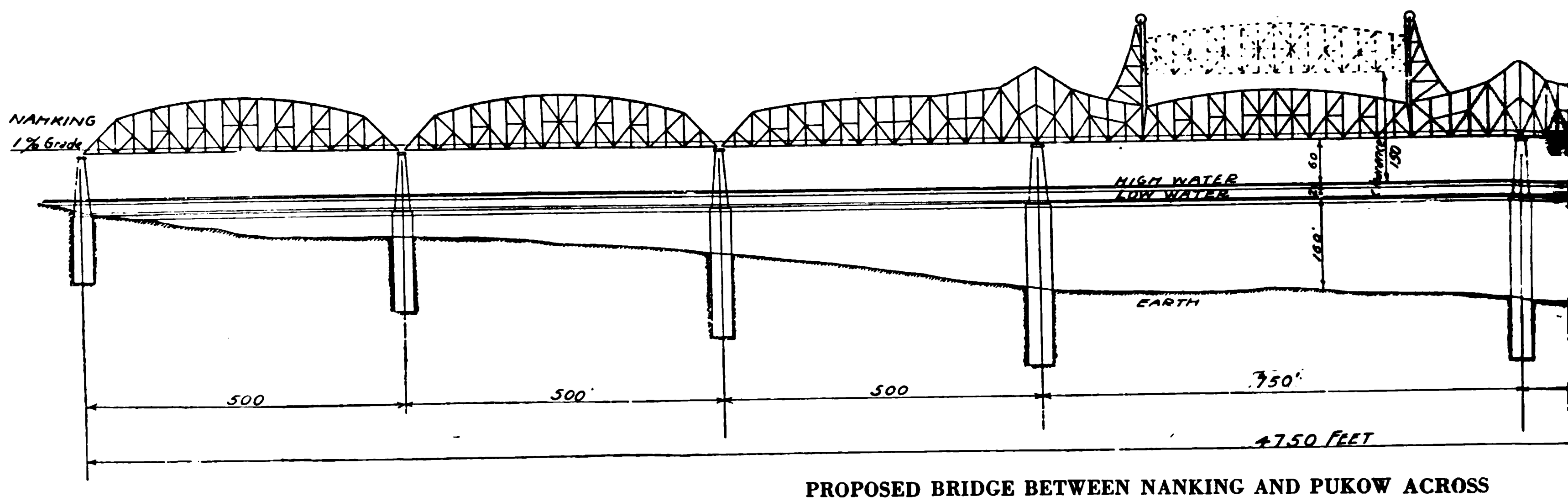


Preparing and Coating Tungsten Wire for Mounting

Exhaust Machines



Exhaust and Sealing in Machines



PROPOSED BRIDGE BETWEEN NANKING AND PUKOW ACROSS

Report Upon a Project for Bridging the Yangtze River Between Cities of Nanking and Pukow

By Dr. J. A. L. Waddell, Consulting Engineer

This is the second of the bridge designs prepared by Dr. Waddell for the ministry of communications and given by them to the Journal of the Association of Chinese and American Engineers for publication. The material is self-explanatory. It may be interesting to note that Dr. Waddell did not consider a bridge across the Yangtze at Nanking justifiable in view of the traffic. The river bottom at this section is extremely uncertain and consists of a soft silt to an unknown depth. The harbor-master instructs all ships anchoring there to lift their anchor at least once every 36 hours. Anchors left in longer than this time usually become imbedded and cannot be pulled out.

The type of foundation recommended by Dr. Waddell is similar to that prepared for him for the bridge across the Mississippi River at New Orleans, for which he was the consultng engineer. The erection of the bridge at New Orleans has been postponed due to the high price of steel resulting immediately after the conclusion of the war, but operations are expected to be resumed some time in the near future. The Mississippi at New Orleans also has an unknown scour and a varying silt bottom.]

Peking, October 28th, 1921.

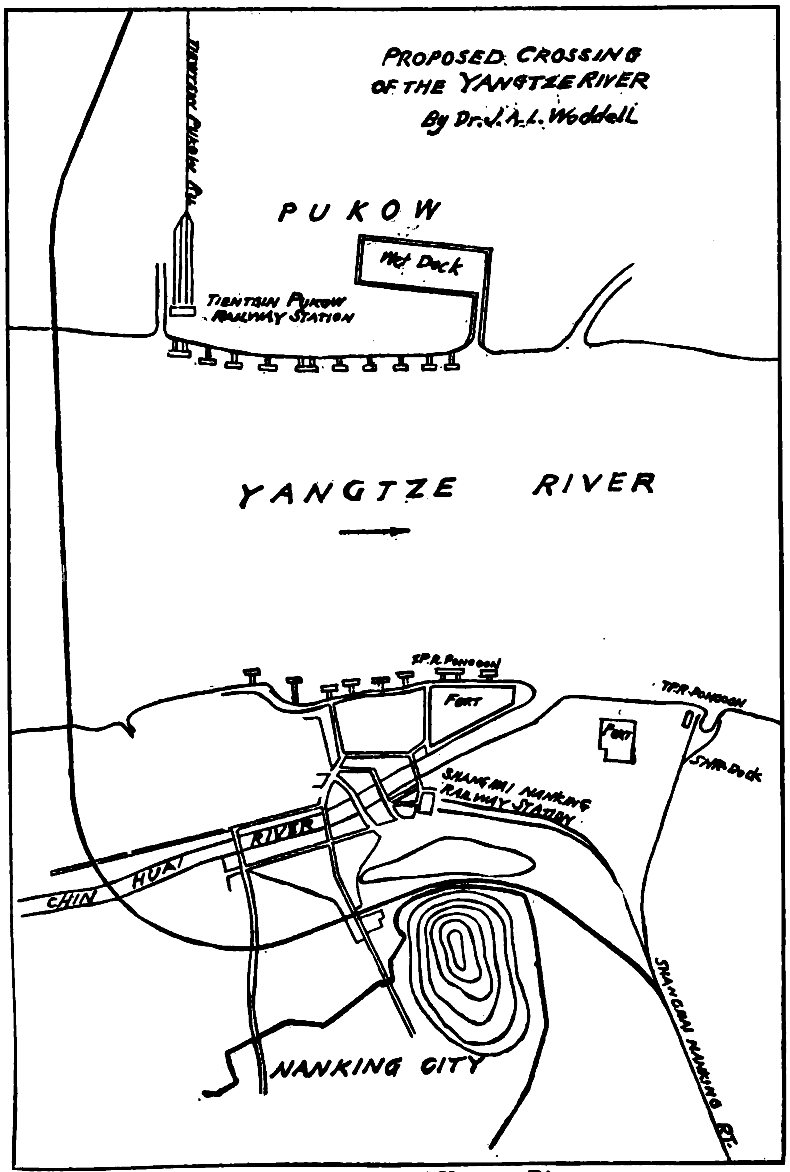
To His Excellency,

The Minister of Communications,

PEKING.

Your Excellency,

After completing my investigations at the mouth of the Han River in relation to the proposed bridging near there of that stream and the Yangtze-Kiang. I proceeded to Pukow for the purpose of looking into the possibility and expediency of building a bridge across the latter river between the cities of Pukow and Nanking; and now beg to report as follows :



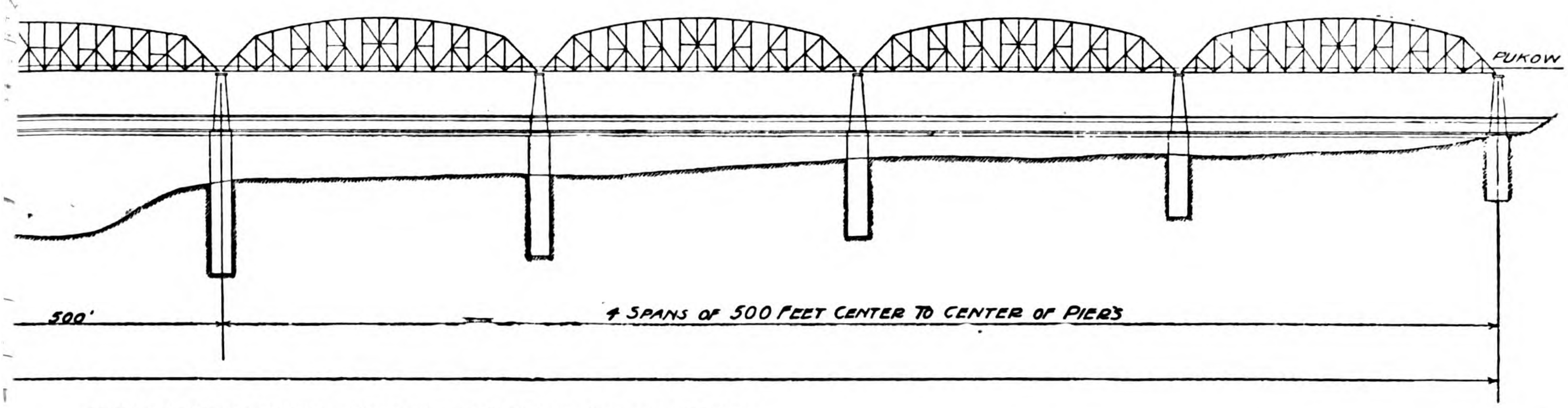
Proposed Crossing of Yangtze River

FEASIBILITY.

The conditions for building a birdge at this location are difficult, for the caissons of the piers would have to be put down far deeper than those of any other bridge yet built, because, as well as I can determine, there is no bed-rock within reach, and the depth of water at lowest stage is over 160 feet. This does not mean that it is impossible to build the proposed structure, but only that it would be expensive, especially as contractors are timid about attempting to accomplish the unprecedented. However, I should not hesitate an instant about undertaking to design and engineer the building of such a bridge, were I called upon to do so. I have already advocated the construction of a great bridge across the Mississippi River at New Orleans, where the conditions are unprecedented and quite similar to those here under consideration. However, in this case it might prove necessary to found the caissons somewhat deeper below low water than those for the proposed New Orleans strcuture.

EXPEDIENCY.

In respect to the question of expediency, I am compelled to report adversely to the pro-



THE YANGTZE RIVER. DESIGNED BY DR. J. A. L. WADDELL

ject; because there is no traffic of any kind between the two cities which would begin to warrant the construction of such an expensive structure as the proposed bridge would have to be. Nor do I believe that, even in the next fifty years, there will be any business large enough to require its being built. Only a single line of railway now enters Nanking; and that line parallels the river from Shanghai. As steamers can always carry freight more cheaply than railroads, all freight from Shanghai destined north will naturally go by water to Pukow, and will not need to be carried across the river. Thus only the passenger traffic of a single railway would use the bridge; and at present there is not enough of it, in my opinion, to warrant the building of a carferry—much less a bridge. The little passenger traffic bound northward, and that of the reverse journey towards Shanghai, can readily be taken care of for many years to come by two fair-sized ferry boats of the ordinary type.

Although I am opposed for economic reasons to the construction of the bridge, as the problem of how to build it and to determine the approximate cost thereof has been set me, I shall proceed to its solution.

Sources of Information.

I obtained the necessary information for the making of cost estimates from several reliable maps and charts, and by asking questions of certain persons residing in Nanking, also by a personal reconnaissance of the route for a railway connection between the roads on the two sides of the river. On Sheet No : 1 of the accompanying drawings is shown the line of route, from the railway to the south to and across the river and then towards a connection with the railway on the north. The route was easily determined, as there was but little choice of crossings. The cities are situated opposite each other on the two sides of the river and at its narrowest point in the vicinity. The bridge tangent was located up-stream from the right line joining the ciries centres for two reasons :

First. It gives a satisfactory means of connecting the two railway systems without material injury to property, and

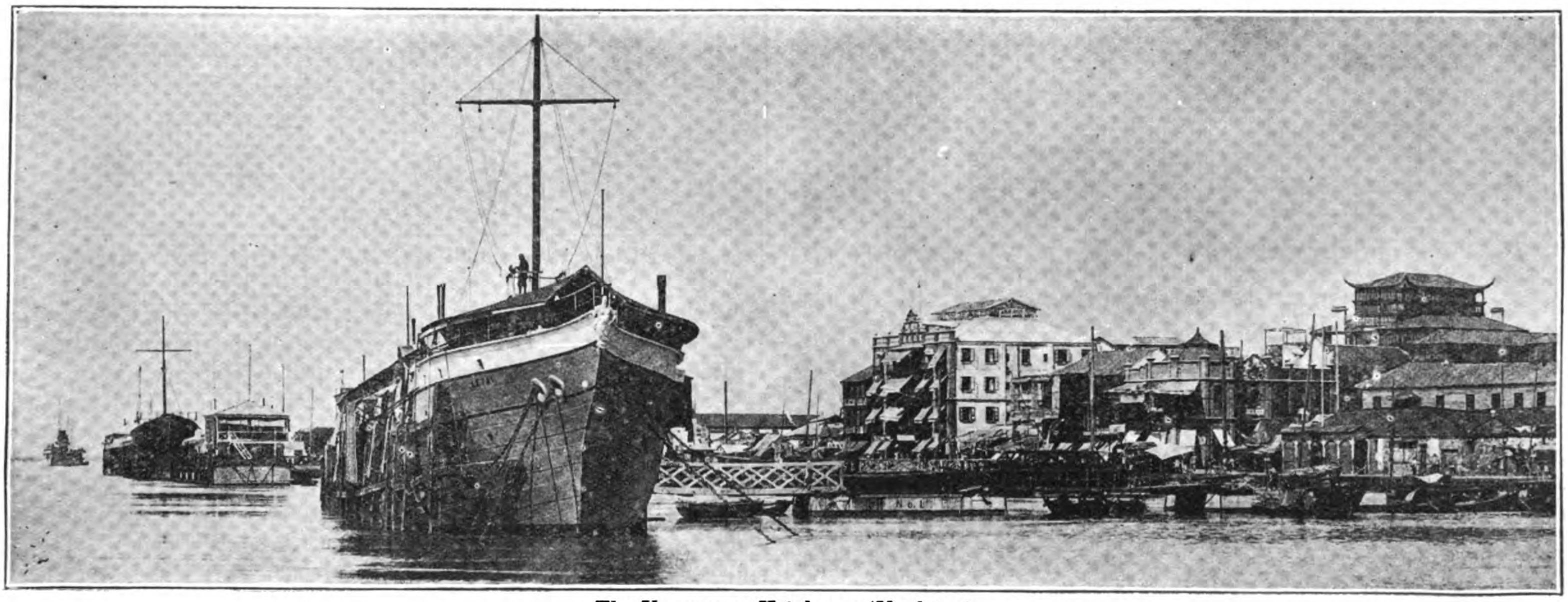
Second. It avoids the necessity for opening the lift-span to accommodate the passage of vessels not destined for up-river points beyond Nanking.

River Conditions.

As these are of a similar character to those at Hankow, although there are not as many junks passing, I have assumed, as before, a minimum clearance of 150 feet above extreme high water for ocean-going vessels under the vertical-lift span and one of 60 feet above the same everywhere else for junks. The difference in height between extreme high water and extreme low water is only 24 feet. or less than half of that at Hankow.

Layout.

Starting from the south bank, the structure, consists of two simple-truss spans of 500 feet each, then an anchor arm of 500 feet, then a cantilever span of 750 feet, then another anchor arm of 500 feet, and finally four simple-truss spans of 500 feet each, all distances being measured from centre to center of piers. These



The Yangtze at Hsiakuan (Nanking)

nine spans will cover practically the entire river between highwater shore-lines.

The greatest depth assumed for caisson foundations is 250 feet below low water at the deepest part of the section ; and from there to the banks it gradually reduces to 100 feet. It is possible, of course, that these depths are not great enough to reach sufficiently-solid material to afford proper bearing-resistance, but this point cannot be settled without the making of expensive borings. The assumption, however, is sufficiently accurate for the preparation of a preliminary estimate of cost.

TRAFFIC PROVISIONS.

As the cities of Nanking and Pukow are not of great commercial importance, and as their populations are comparatively small, there is no need to provide on the bridge for highway or pedestrian travel. In future it would be practicable to build approaches to the structure for an electric-railway system and to carry its tracks by gauntleting over the space occupied by the steam railway.

Owing to the great width of river and to the possible future importance of the proposed bridge, a double-track-railway structure has been adopted. It would not be good engineering to consider the building of a single-track structure for such a crossing.

GRADES.

The limiting grade on the approaches I have taken as one per cent., properly compensated, of course, for curvature.

LIVE LOAD.

As in the case of the proposed Hankow crossing, the railway live load selected is Class 60.

METHODS OF CONSTRUCTION.

Owing to the great depths of both the water and the caisson foundations, the sinking will have to be done by the open-dredging process, and the shells of the caissons will have to be built of timber. The piers are to be constructed as described in my previous report upon the proposed Hankow crossing and the spans are to be floated to position.

MATERIALS.

In respect to the unit prices of materials and the quantities thereof, see the just-mentioned report.

Estimate of Total Cost

SUPERSTRUCTURE.

Ordinary carbon steel	63,000,000-lbs. @ 11 cents	$ 6,930,000
Machinery and Ropes	680,000-lbs. @ 50 cents	340,000
Floor	4,750 lin. ft. @ $30	143,000
Counterweights ..	900 cu. yds. @ $25	23,000
Electric machinery and house	.. .. ..	54,000
Total Cost of Superstructure	.. .. ..	$ 7,490,000

SUBSTRUCTURE.

Main Piers, 4 @ $1,100,000 (Average)	.. ..	$ 4,400,000
End Piers, 2 @ 280,000 (Average)	.. ..	560,000
Other Piers, 4 @ 530,000 (Average)	.. ..	2,120,000
Total Cost of Substructure	.. .. ..	$,080,0000

TOTAL COST OF STRUCTURE.

Superstructure	.. ..	$ 7,490,000
Substructure ..	.. ..	7,080,000
Approaches ..	.. ..	3,150,000
Summation ..	.. ..	17,720,000
Engineering and Contingencies, 10%	.. ..	1,772,000
Grand Total Cost of Structure	.. ..	$19,492,000
Say ..	.. $19,500,000	

ECONOMICS.

The close equality in total costs of substructure and superstructure indicates that my layout is not far from economic. The diagram on page 164 of "Economics of Bridgework" shows that the economic span-length for foundations of this assumed depth for double-track railway bridges is 430 feet ; and the diagram on the previous page evidences that a variation of 50 feet above or below this figure would make very little difference in total cost of structure. This would make the range for such depth from 380 to 480 feet, while I have adopted 500 feet. I think that, for the assumed conditions at the proposed crossing, the larger figure is more nearly correct than the record of the diagram, owing to the high price of substructure timber and the difficulties that would be encountered in putting the caissons into proper position.

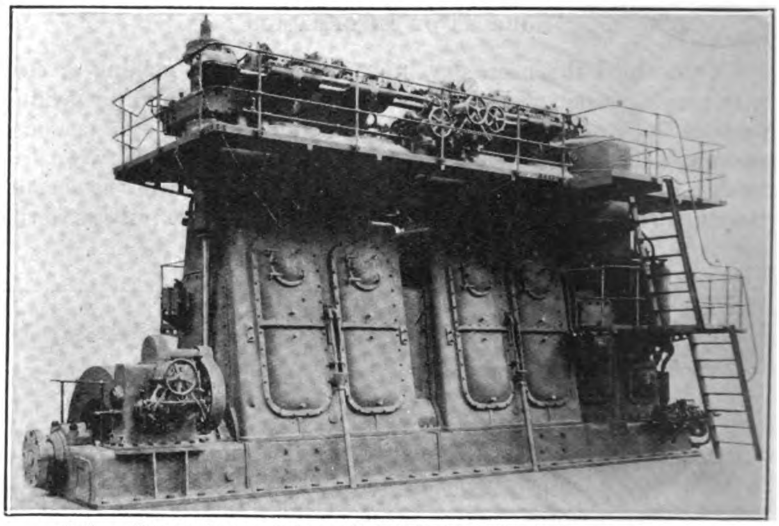
CONCLUSION.

Owing to lack of reliable data concerning substructure conditions, the preceding estimate is not as accurate as the one I made you for the proposed bridges over the Yangtze and the Han Rivers at Hankow ; but it is close enough to correctness for all practical purposes, especially in view of the fact that I am advising against the construction of the bridge.

The Largest Diesel Engined Vessel

A New Success of the Sulzer 2-Cycle Engine

THE Union Steamship Co. of New Zealand has placed an order with the Fairfield Shipbuilding Co., Ltd. in Glasgow for a motor passenger liner of 22,000 tons, which will be equipped with machinery of the Sulzer 2-cycle type of 12,000-13,000 BHP. Beside the main engines there will be auxiliary engines of about 1,500 BHP., the total engine power amounting to about 14,000 BHP. This ship will not only exc'te general interest because it is the largest passenger motor liner, driven by Diesel engines, but specially in view of the machinery, which in size and power by far exceeds any-



Sulzer Direct Reversible 1,250-S.H.P. Two-Cycle Marine Engine

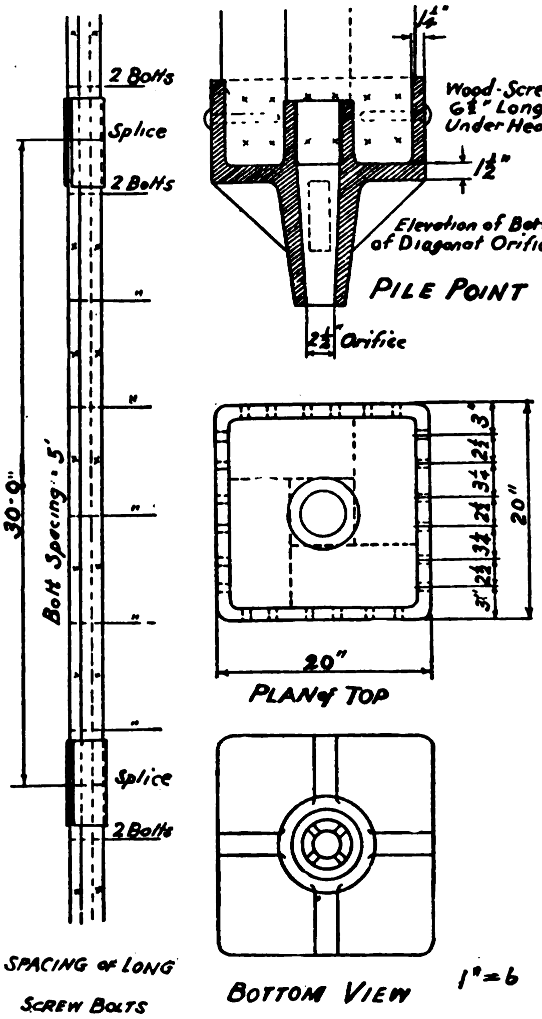
thing that has been done up to now in connection with motor ships. The Fairfield Shipbuilding Co. is a licensee of Sulzer Brothers in Winterthur. This new order seems to prove the fact, that for large powers the 2-cycle engine is decidedly more advantageous than the 4-cycle and as the general tendency is towards the building of big ships an important field is opened for the 2-cycle system of Diesel engines.

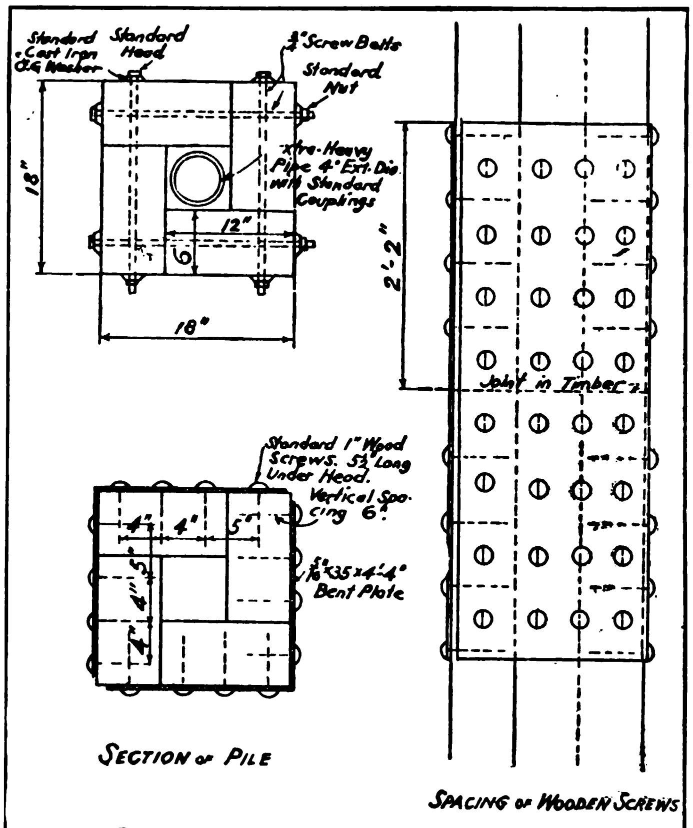
It may be mentioned as a curiosity that this special development of motorship equipment has been started by a firm in Switzerland, a country completely cut off from the sea.

A Hydraulic Pile for Use on the Yellow River Bridge and for Other Foundations in China

Recommended by Dr. J. A. L. Waddell to the Ministry of Communications

The large saving made by Dr. Waddell on his different bridge designs for the Yellow River and Yangtze crossings were in great part made possible by the type of foundation chosen by him. This included the use of the hydraulic pile as described below. Dr. Waddell believed that the most economic type of foundation for the majority of the Chinese railroad bridges, particularly those in the alluvial plain regions, was the pile caisson type, that is, a caisson sunk to ten or fifteen feet below the river bottom and resting upon concrete imbedded piles.—*Journal of the Association of Chinese and American Engineers.*





DESIGN OF A JET-PILE FOR THE KIN-HAN RAILWAY

By Dr. J.A.L. Waddell

Scale 1" = 1'

ABOVE is a drawing of the hydraulic pile which I evolved to meet the conditions at the Yellow River crossing, and at similar crossings in China. All the details are shown excepting the block to interpose between the top of the pile and the hammer. This I can describe and thus save the labor of draughting.

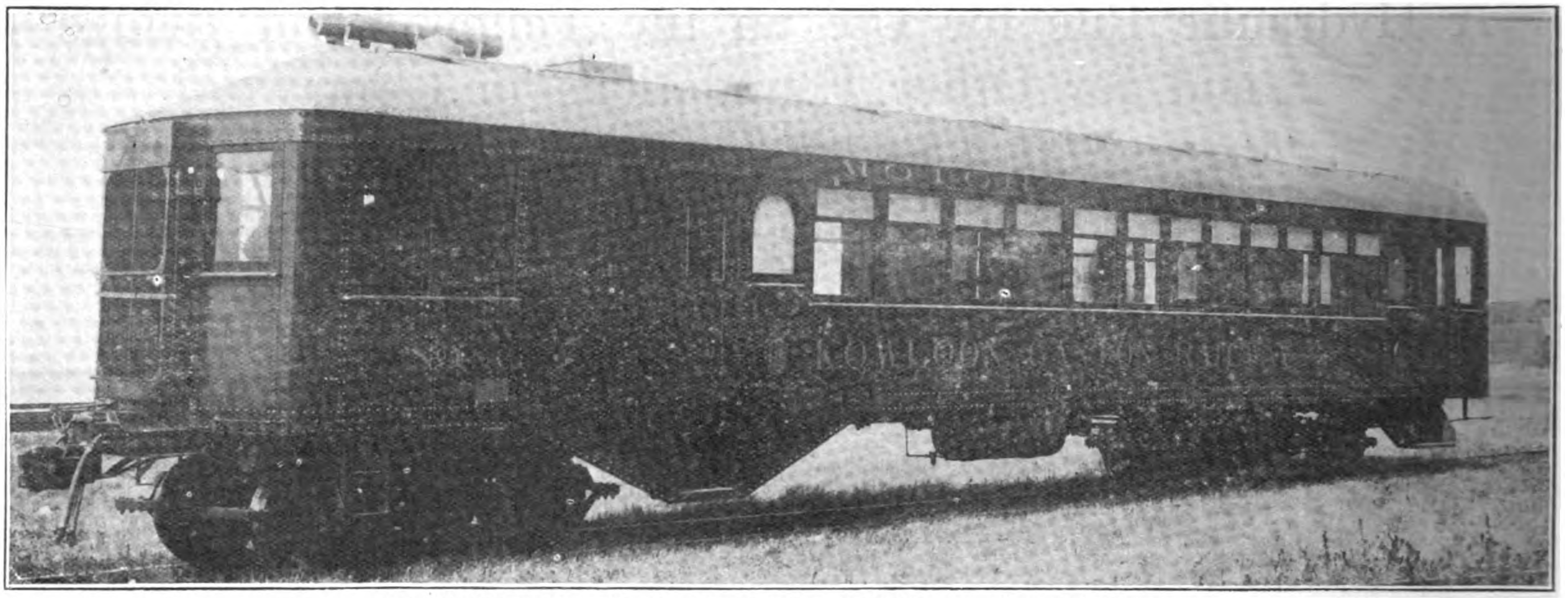
It can be made of either timber or metal, and there must be a hole at one side large enough readily to permit the passage of the goose-neck. When this goose-neck is to be removed, the hammer is raised, and then the block is raised also. After this, the goose-neck is unscrewed and another length of pipe attached.

There are two ways in which this pile can be used, depending upon the condition of the soil. If the latter be such that you can drive down a pile say 50 or 60 feet by the water-jet, then take off the jet, extend the pipe, extend the pile, put on the jet again, and proceed, your work would be much simplified, for then you would not have to pick up and handle very long piles and submit them to great bending moments. In this case, you can use timber scabs for the splicing of the abutting ends of the pile sections, and thus save the expensive metal that I have laid out for splicing.

The second case is when the material is such that if you were to try the method just described, you would be unable to start the jet to working again after lengthening the pile. In that case, the pile must be built full length at the out-set, and the pile driver must be high enough to take care of it. Under these conditions it will probably be necessary to use the steel plates for splicing, because the scabs would not be strong enough to resist the bending due to the weight of the long pile, if it were picked up near the middle to swing it into place.

The following is a description of the pile. It is to be built of 6-in. by 12-in. timbers thirty feet long, more or less, but all of the same exact length, in a square section of 18-in. with a 6-in. square hole in the interior. All joints are to be square cut. At the lower end of the pile there is a casting of either steel or iron, preferably of the latter, if made in China, as it should be. Probably a cast-iron point would weigh quite a little more than a cast-steel one. The design that I have made will be amply strong for all conditions to be met with, including beds of fairly large boulders. You might find later on that you can trim down the thickness of the metal considerably, and thus economize on the cost. If you know for certain that

(*Continued on page 753*)



The Hall-Scott Motor Coaches in operation on the Kowloon-Canton Railway

Motor Coaches on the Kowloon-Canton Railway

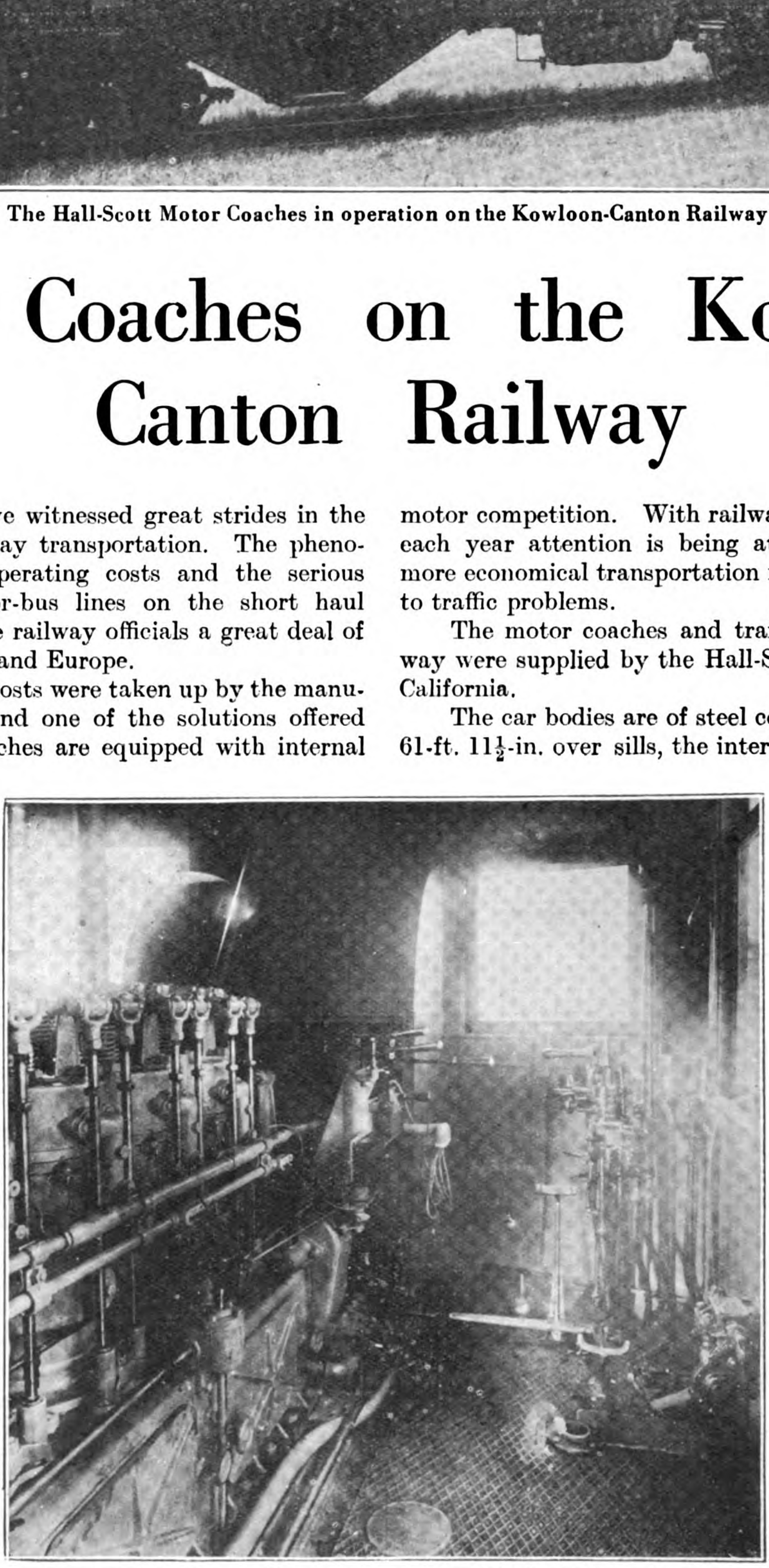
THE last few years have witnessed great strides in the development of railway transportation. The phenomenal increase in operating costs and the serious competition of motor-bus lines on the short haul traffic, has caused the railway officials a great deal of thought in both the United States and Europe.

The problem of cutting these costs were taken up by the manufacturers of railway equipment, and one of the solutions offered was the motor coach. These coaches are equipped with internal combustion engines, from which the locomotive and lighting power is derived.

The first railway in the Far East to adopt these coaches was the British section of the Kowloon-Canton railway. Two of these coaches arrived at Kowloon in the early part of December 1921 and during the past year have proved entirely satisfactory. The directors of the Manila Railway Company are now recommending the use of similar cars in order to compete with the increasing number of motor passenger and freight autobuses, and from Korea we learn that the authorities have abandoned the idea of electrifying the Seoul-Jinsen (Chemulpo) line at an estimated cost of Y.1,800,000, in favor of automotive railway cars, which can be purchased for Y.300,000. Other parts of the Far East are also confronting similar transportation problems arising from the loss of revenues through motor competition. With railway operating costs mounting higher each year attention is being attracted to the employment of a more economical transportation medium, by applying motor trucks to traffic problems.

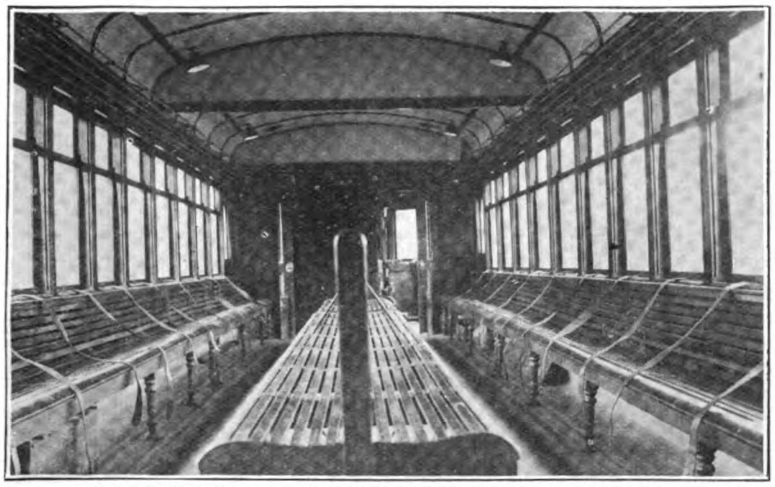
The motor coaches and trailers for the Kowloon-Canton railway were supplied by the Hall-Scott Motor Company of Berkeley, California.

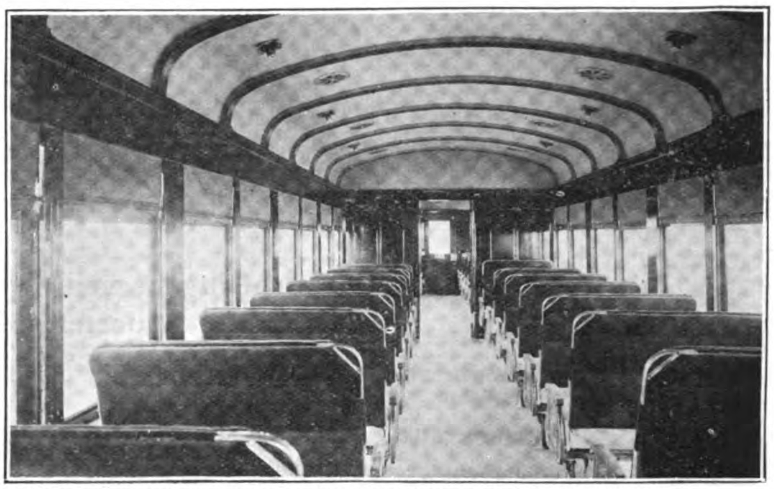
The car bodies are of steel construction throughout, measuring 61-ft. 11½-in. over sills, the interiors finished in west coast mahogany, the first-class compartment being fitted with seats upholstered in imitation leather, and the second and third with hardwood slat seats. The coaches and trailer are lighted throughout with electric lights by means of a 3½ K.W. Delco internal combustion engine, ceiling fans being provided in the first-class compartment.



Interior of the Motor Compartment of the Hall-Scott Motor Coaches for the Kowloon-Canton Railway

The motor coach power consists of a Hall-Scott M-6 type 150 h.p. 6-cylinder engine with cylinders 8-in. by 10-in. adapted for using kerosine as fuel. The motor is equipped with high-tension magneto and distributor with coil and battery connection providing two separate sets of ignition entirely independent of each other and running to two sets of spark plugs. Carburetor is of the float feed type. The air compressor is of two cylinder water cooled type with cylinders 4-in. by 4-in. directly driven from engine. The engine is equipped with

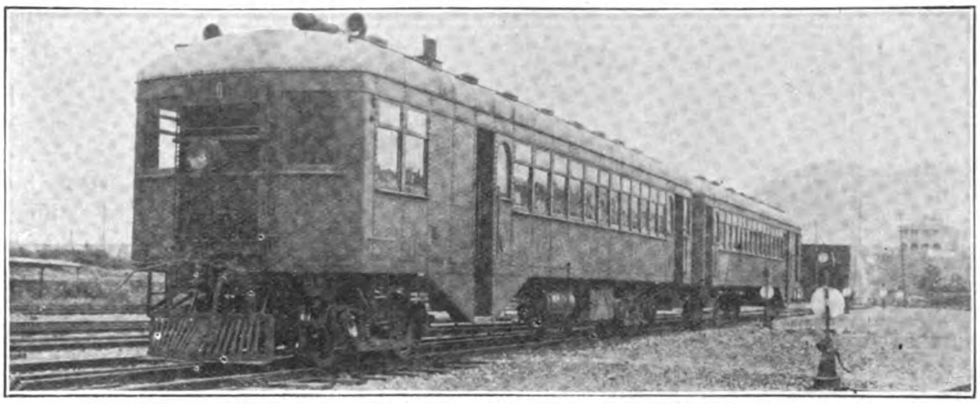




INTERIOR VIEWS OF PASSENGER COMPARTMENTS OF THE NEW MOTOR COACHES FOR THE KOWLOON-CANTON RAILWAY

Third Class **First and Second Class**

electric starter. Engine cooling is provided by means of a vertical copper tube radiator with large diameter belt driven fan in connection. A 75-gallon storage tank is installed on the car underframe with pipe leads to side wall, double compartment kerosine and gasoline gravity tank, suction pump driven directly from engine to main tank for carburetor feed; gasoline compartment of gravity tank providing for initial starting of engine.



Motor Coach and Trailer, Kowloon-Canton Railway

Transmission is of the selective type allowing of four speed changes in either direction.

On the level the motor coach can run up to 50 miles per hour, or with trailer 40 miles, the combined seating capacity being 90 third-class, 36 first and 36 second and luggage compartment. The coaches are fitted with Westinghouse quick-acting and straight-air brakes.

A HYDRAULIC PILE

(Continued from page 751)

there are no boulders to be encountered, you can make the casting as thin everywhere as it is practicable to pour it.

The timbers are to be bolted to the casting so firmly that there will be no chance for detachment during driving. The splices, if of steel, are to be made with $\frac{5}{16}$-in. by 35-in. plates, 4-ft. 4-in. long, bent to a right angle, and bored for the passage of wood-screws $5\frac{1}{2}$-in. long under head—but no longer. As shown on the drawing, the arrangement of the holes must involve staggering on the two sides of the bent plate, so as to avoid clashing of screws.

As before indicated, under certain conditions plank scabs $2\frac{1}{2}$-in. by 17-in. by 3 or 4-ft. long with beveled lower edge can be used the thickness at the lower end being about $\frac{1}{2}$-in.; this to provide for going through hard material such as gravel or boulders.

The four timbers forming the pile are to be screw-bolted together with $\frac{3}{4}$-in. bolts and cast-iron washers—all as shown on the drawings. There is no need whatsoever for sinking these washers into the timber in order to avoid friction.

There is to be a 4-in. extra-strength pipe cut into lengths convenient for handling and attaching, with the usual couplings that turn in a right-handed direction. The connection of the pile to the casting, however, must be left-handed, so that by twisting the long pipe in a right-handed direction it will be detached therefrom after the pile is driven. On this account, whenever an extra length is being added to the pipe, the part already in place must be held tightly by tongs so as to prevent any turning thereof.

At the top of the pipe there is to be a goose-neck, attached by ordinary couplings, with some kind of a quickly-made connection to the 4-in. hose leading to the pump.

This hose is to be of the very strongest kind procurable, so as to permit of a high water pressure—say 200 lb. per square inch.

For the timber I would suggest Oregon fir cut *full size* so that the pile, when finished, will square all of 18-in. If the timber be purchased in a large quantity, the odd size will cost almost nothing extra, except for the larger amount of timber used. Of course, timber of standard market section, which is always a little less than the nominal section, can be used, but it will not be quite so convenient. It might be found after trial that it would pay to have all timber dressed full size on all four faces, but I anticipate that this refinement will not be needed.

Of course, care must be taken to stagger the long screwbolts attaching the component timbers, in order to avoid interference and the unnecessary weakening of the timber section at any point.

Holes will have to be bored full-size or even $\frac{1}{16}$-in. greater for the long screw-bolts; but only very small holes should be used for the short wood-screws. Possibly these holes may be omitted altogether, but I think not.

If any trouble be experienced in making the casting in China, it can be divided into two parts by a plane on A. B, but in that case the total thickness of the two adjoining bases should be $2\frac{1}{2}$-in. or $1\frac{1}{4}$-in. each. These two castings would have to be bolted together by a number of turned 1-in. or $1\frac{1}{4}$-in. bolts in drilled holes.

All bolt-holes in the casting would have to be drilled.

The volume of water used would have to be about 500 gallons per minute, at least, and possibly somewhat more, all depending upon the character of the soil to be penetrated. It is true that in some of my work I have used 350 gallons per minute and have found this to be sufficient, but I believe that the larger amount would be preferable.

Japanese House Buys $50,000,000 Yearly in U.S.

Mitsubishi Interests Controlling Eleven Separate Enterprises, Employing 100,000 Men, Large Importers of American Products

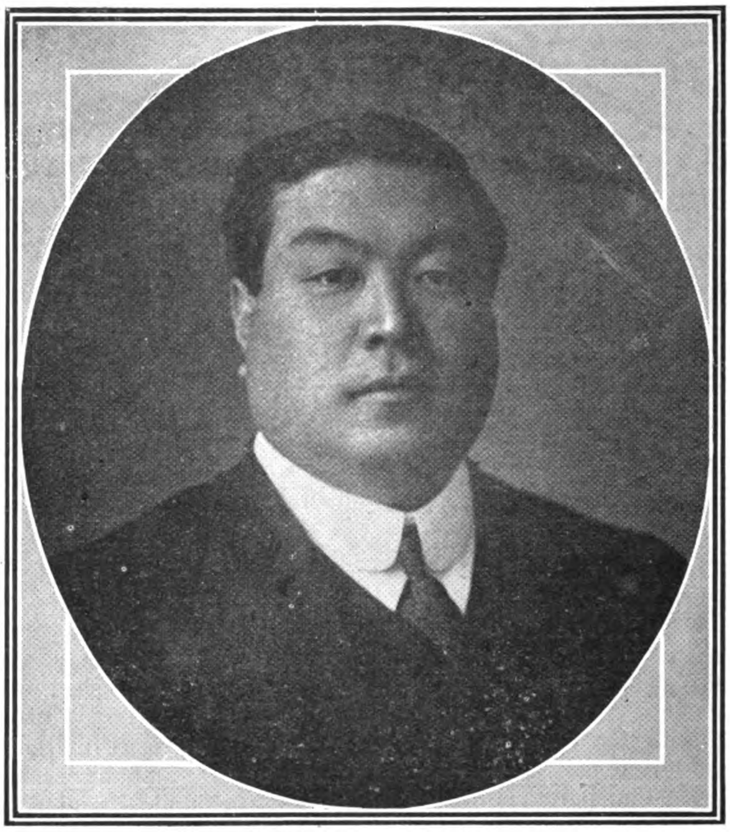
By A. V. Gilleaudeau in the "American Exporter"

FIFTY million dollars a year or almost one million dollars a week! Such is the average value of the purchases of American goods made by the New York branch of a large Japanese trading company for its principals in the Orient. In this fact alone there is a story of interest and significance to merchants everywhere.

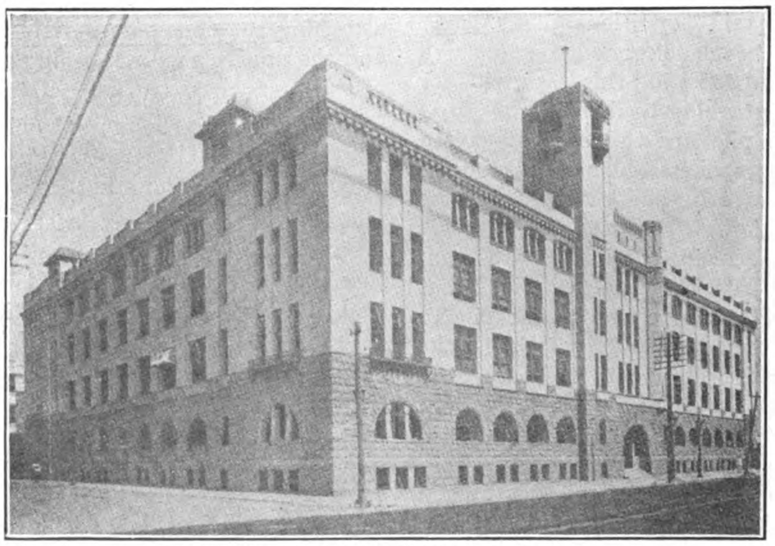
The products which the Mitsubishi Company buys in the United States include machinery of all kinds, machine tools, motor cars, lorries and tractors, iron and steel products, electrical installations, freight handling and conveying equipment, construction material and many other lines.

The company has its headquarters in Tokyo, with branches in all the principal cities of Japan, as well as in China, India, Australia, Siberia, Dutch East Indies, Straits Settlements and the Philippine Islands. In addition to two branch offices in the United States, in New York and Seattle, Wash., the company likewise maintains several European offices.

The Mitsubishi Trading Company buys in the United States not only for the account of its principals in Japan but on indent for its customers in the various markets in which it operates. The variety of goods which it is called upon to purchase in the United States is indicated by the fact that the Mitsubishi interests in Japan control eleven separate enterprises employing some 100,000 men. Among these enterprises, most of which are large importers of American goods, are ship-building yards, iron and steel mills, paper mills, machinery plants, glass factories, canneries, a warehousing company, engineering works and others. The trading company, which is specifically occupied with a general import and export business, is an outgrowth of the requirements of these various interests. Organized in 1918 to import the requisite supplies for these interests and dispose of their products in foreign markets it has since then developed an important import and export business on its own account.



Baron Koyata Iwasaki
Head of the Great Mitsubishi Interests in Japan



The Mitsubishi Head Office at Tokyo

Departments Are Under Direction of Specialists

The New York office of the Mitsubishi Trading Company employs 55 people and its business is carried on by six different departments. These departments deal respectively with machinery, metals, general merchandise, coal, oil and steamships. The heads of these departments are specialists of long experience in their individual lines, with thorough knowledge of requirements of the markets in which the company operates. As is necessarily the case in the transaction of a business of so large an aggregate volume, accuracy and detailed instructions to manufacturers are characteristic of the buying policy of the New York branch. All orders to American manufacturers are detailed, specific and comprehensive, and are embodied in a special form of contract evolved by the house. Orders are accompanied by explicit instructions covering packing, marking, invoices and necessary documents. Careful attention to these details, the New York office has found, eliminates error and delay in securing the desired merchandise.

The buying policy of the house is that of shrewd and progressive merchants everywhere. Large stocks of readily salable merchandise are bought for, and carried by, the various branch offices in the Orient. Samples of such merchandise as textiles, provisions and certain types of machinery are on display in these branches. Bulk goods such as heavy chemicals, fertilizers, grain, iron

and steel products, etc., are always stocked. The New York branch, when it observes that the demand for American products in any line in especially active, takes measures to anticipate the requirements of its principals for some time in advance.

Research Department Keeps in Touch with Market Conditions

One of the progressive features of the New York branch of the company is a well-staffed research department whose function it is to keep in close touch with market conditions throughout the United States, and which through export journals and other sources of information is always well posted with respect to new trends in manufacturing as well as new and successful merchandising ideas as they are developed. Constant vigilance and careful attention to these developments as they occur has been found by the New York branch to be extremely profitable, since it has on many occasions been able first to introduce improved equipment or merchandise to its markets abroad.

THE NEW MITSUBISHI BANK AT TOKYO

The architecture and equipment has been adopted from one of the most famous banks in New York City, and much of the equipment imported from the United States. The bronze doors were specially made in the U. S. at a cost of $45,000. All the tiling of the large banking floor was made by an American manufacturer; the rugs and carpets used in the building were ordered from a firm of prominent American decorators, and the safe deposit vaults were bought in the U.S. at a cost of $60,000.

Another function of the New York buying office of the company is to secure the agency for its markets of attractive and suitable American merchandise. At the present time it acts as sole agents in these markets for several American manufacturers of motor cars and lorries, machinery and machine tools, electrical materials and machinery, tyres, tubes and mechanical rubber goods.

Transactions Are on a Big Scale

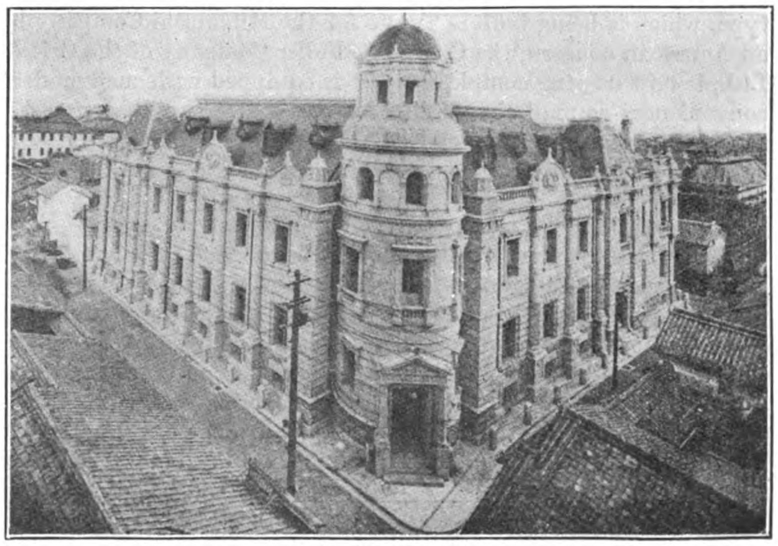
These and other similar lines are handled in the Far-Eastern branches of the Mitsubishi Trading Company, in very much the same way as they are in the United States. Large stocks are carried and a great deal of attention is devoted by the company to adequate and attractive display of goods and to sales promotion.

By far the largest proportion of the business transacted by the New York office is for the account of the various enterprises controlled by the Mitsubishi interests in the Orient, for the Japanese government, and for large industrial establishments in Japan which the company numbers among its customers. The purchases of the company in the American market are therefore unusual and somewhat remarkable both in respect to diversity and importance.

For example, during the first months of 1922, the New York office bought 70,000 tons of steel materials at a cost of some $3,000,000, 30,000 tons of which were steel rails purchased for the Imperial Railways of Japan. Recently the Mitsubishi Warehouse Company which operates as shipping and forwarding agents, custom-brokers and wharfingers in the principal ports of Japan, decided to build a new wharf. The company sent its own engineers to the United States to study as models the army and navy bases in the principal American ports. These engineers upon the conclusion of their investigation returned to Japan, drew their plans, sent the specifications to the New York buying office, and bids called for from American manufacturers for the supply of the complete equipment required.

It is interesting to note that the warehouses of the Mitsubishi Warehouse Company, which cover a total of 150 acres in the principal ports of Japan, were modeled entirely upon similar developments in the United States. The sheds and warehouses, with few exceptions, are built of brick and stone with iron frames, and are equipped with automatic sprinkling systems, hydrants, fire-extinguishers and automatic fire-proof doors, all of which were imported from the United States. Similarly, the electric cranes and automatic freight handling equipment were bought from American manufacturers.

Kobe Branch Office



Osaka Branch Office

Another large order recently placed by the New York office shows the progressiveness of the house in its policy of introducing improved machinery and equipment. This order, given by the Japanese government, called for the purchase of a ship-stabilizer weighing 170 tons, the largest ever built in the United States,

The Mitsubishi Bank, Ltd, recently completed the construction of an imposing building in the Marunouchi district of Tokyo, where the Mitsubishi interests are erecting a number of office buildings similar to those lately erected in the United States. The architecture and equipment of the new banking house is adapted from that of one of the most famous banks in New York. The vaults, for example, were bought in the United States, at a cost of $60,000. The bronze doors, which cost $45,000, were likewise bought in the United States. The entire tiling of the enormous banking floor was specially made by an American manufacturer, and all the rugs and carpets used in the building were ordered from a prominent firm of American decorators.

These examples indicate the unusual buying problems which from time to time confront the Mitsubishi office in New York. Concurrently, however, the buyers are occupied with less spectacular, if no less important activities. The general merchandise department purchases and ships to the Orient large quantities of grain, fertilizer and heavy chemicals. The machinery department is constantly sending forward such goods as cranes, pneumatic hammers, welding machinery, lathes, cotton-spinning machinery, elevators, switchboards and meters. It does a considerable volume of business in motor cars and lorries, tractors, and automative products generally.

It frequently is called upon to purchase complete equipment for some new plant belonging to one of the several Mitsubishi enterprises, such as, for instance, a large installation of paper-making machinery bought some time ago for the Mitsubishi Paper Mills. Similarly, the machinery department has purchased in the United States rollers and furnaces for the large iron and steel works controlled by the Mitsubishi interests, and mining machinery for its coal and iron mines.

The activities of the various Mitsubishi enterprises for which the trading company buys in the United States, and the merchandising activities of the trading company itself in the Far East illustrate the thorough and consistent application of principles and methods characteristic of business in the United States. The showrooms of the Mitsubishi Trading Company in the Orient are well adopted to the demonstration of machinery and adequate display of goods, and are provided with all the facilities for effective merchandising which are incorporated in similar buildings in the United States.

The Marunouchi building, a modern office structure of American type, which is being built in Tokyo for the Mitsubishi Company by an American concern, the George A. Fuller Company of the Orient, Ltd., is now nearing completion. It is equipped with such modern conveniences as mail chutes, heating and water supply systems of the most up-to-date type, and has 11 elevators. The ground floor is traversed by two arcades, which are lined with about 30 shops.

An idea widely employed by large industrial enterprises in the United States, the formation of organizations of their employees, has been successfully adopted in the Mitsubishi Club, an association with a membership of 9,000, having 47 branches throughout Japan. The club is instrumental in fostering the spirit of the various enterprises under Mitsubishi control through its several activities. Among the most characteristic of these are the publication of a magazine for the employees, and the maintenance of a building in Tokyo to provide living quarters for bachelor members of the staff.

American Enterprise in China

(Continued from page 747)

tested, each new lamp taking the place of a lamp which has gone through the test and come out in perfect condition. Further along, there is a line of desks, at which work the skilled filament winders, weaving the hair-like Tungsten wire on to the fish hook supports in the lamp. This fine drawn Tungsten wire, which is the most important element in the lamp, is, and always will be, imported from the general electric factories in America. The lamps go from process to process and at each step are handled by women who have proved best able to do the work accurately and well. The pay is either piece-work or on an hourly basis, as each particular job requires. The increased speed and productiveness of the workers, has justified this factory paying fifty per cent. more than any native manufacturers, but this is done only because of the increased demand for efficiency and care.

As each step is finished, the lamps are carried on large racks from process to process by men. Back in the boiler room and machine shop men do the work, the packing also is a man's job. And as packing in the Orient, for rough handling and humid climate, represents special problems, special attention has been given it. Lamps are wrapped and packed for export in strong wooden boxes so as to prevent breakage and effects of weather. Thus each type of work is suited to the worker, so as to bring the best results.

Good conditions of labor have been maintained as well. The American manager believes the largest results are obtained under conditions similar to those in the United States. Instead of going to long hours and seven day work, the factory has maintained ten hours of work a day, six days a week, the factory being closed on Sundays. Such hours and a full day of rest each week is a thing previously unknown in China.

Child labor will never be an issue in the factory, for no one under sixteen years of age is employed. Due to complete protection against accident, the factory holds a record of no serious accidents since lamp product is began. Such high standards of factory labor react not only towards the most efficient and high quality of production in this factory, but also are the most telling example to the factories in this country, where the tendency is towards the sweat shop conditions so long ago condemned in America.

With expert supervision, and connected and efficient labor, the remaining element in producing good lamps, is raw material. So far as is consistent with the best results, China is made the source of supply. The wire, as already stated, is imported from America and so are certain of the chemicals and brass parts, but glass sand and all other materials are purchased locally, the factory taking only such materials that prove out to be of the highest quality. In the search for the best materials, much light is being thrown on the resources of China.

From the lamp factory itself, the visitor goes across the large roomy lot, to the building where the glass bulbs are blown. The glass furnaces, the bulb blowing moulds, the tube room, and the mixing equipment, all have a capacity for supplying the entire demands of the factory, thus eliminating the need of trusting to outside factories for any of the glass work. The American expert can thus keep track from day to day of the exact quality of the glass that goes into every G. E. Edison lamp.

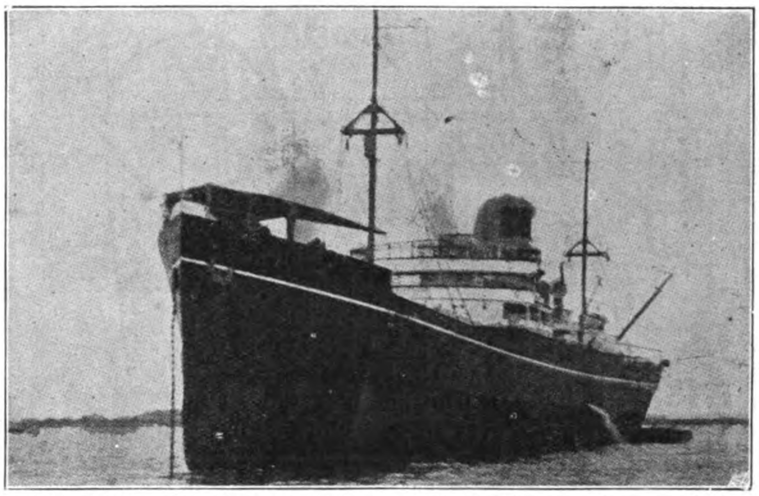
Adjacent to the glass house is the porcelain factory, a new building where production of porcelain wiring devices is under way, but this is another department, indicating however, that the work in Shanghai will not be restricted to the production of lamps, but will expand as the market for different products grows.

As the visitor leaves the open grounds of the China General Edison Company, the American flag at the entrance typifies for him with new meaning, the fact that here a group of Americans are building up a branch of the general electric organization with the same standards as those maintained at home. "Made in China" means in this case, good quality, high efficiency and long life in G. E. Edison lamps.

Electrically-Propelled Cargo Ship "Biyo Maru"

8,800 Tons d.w. on 25-ft. 9-in. Draft. Built by the Asano Shipbuilding Company, Tsurumi, Japan, with Engines by the Ljungstrom Turbine Company, Limited, Finspong, Sweden

THERE has lately been added to the fleet of the Toyo Kisen Kaisha, of Japan, an electrically-propelled cargo ship of 8,800 tons d.w., which it is claimed is the first electrically-propelled merchant ship to be built in Japan. The vessel, the *Biyo Maru*, launched on December 22, last, is one of nine cargo-ships which are building for the same owners by the Asano Shipbuilding Company, of Tsurumi, near Yokohama.



The "Biyo Maru," the first Japanese-built Electrically-propelled Steamer

The vessel is of the shelter deck type with long bridge, forecastle and poop. The hull is sub-divided by means of six water-tight bulkheads giving, in addition to the usual fore and aft peak tanks, two cargo holds forward and two aft, the propelling machinery being placed amidships. There is a double bottom running the entire length of the hull, this being employed for the storage of oil fuel, and also for water ballast. The officers' quarters are situated on the bridge deck, with the exception of the captain's cabin, which is on the navigating bridge, and the crew are berthed in spacious quarters in the forecastle.

The principal dimensions are as follows :

Length, between perpendiculars	400-ft. 0-in.
Breadth, moulded	53-ft. 0-in.
Depth, moulded	32-ft. 0-in.
'Tween deck height	10-ft. 0-in.
Gross tonnage	5,479 tons.
Load draught	25-ft. 9-in.
Dead weight carrying capacity	8,800 tons
Designed speed at sea	11 knots

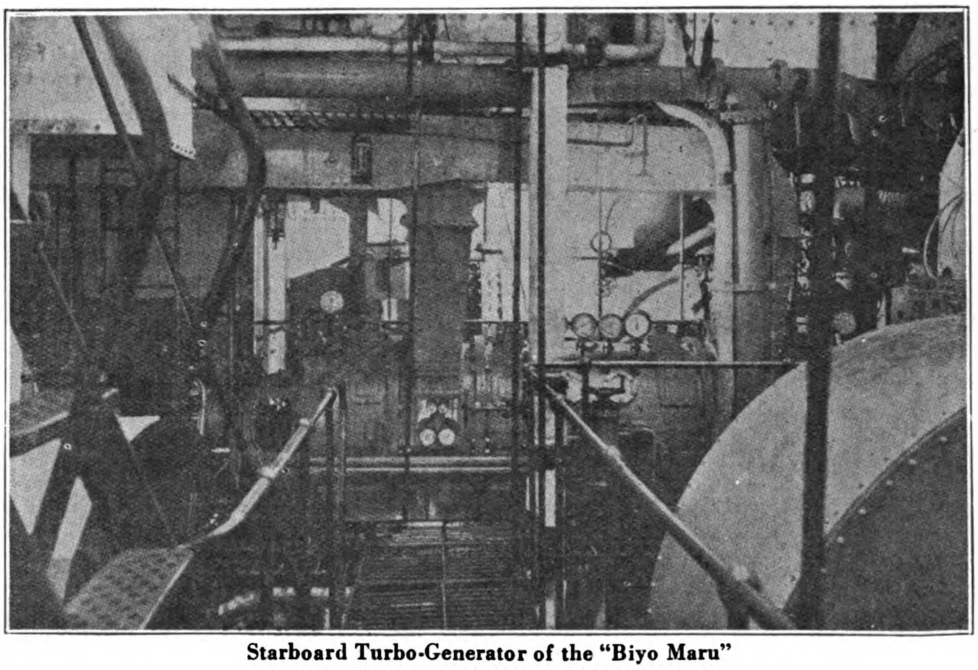
Propelling Machinery

Particular interest attaches to the propelling machinery of this vessel. It consists of two sets of Ljungstrom turbines, each turbine driving two electric generators. The current from these generators is supplied to two induction motors which drive the propeller shaft through single reduction gearing of the usual double helical tooth pattern. This machinery has all been manufactured by the Svenska Turbinfabriks Aktiebolaget Ljungstrom, at Finspong, Sweden, and its arrangement in the engine-room is shown in the drawing reproduction on page a photograph of the engine-room being reproduced on page . The trubines, of the usual Ljungstrom type, are of the radial flow double rotation pattern, and are designed to work with steam at a present of 225-lb. per sq. in., superheated to 650 degree Fahr. at the inlet valve and exhausting into a vacuum of 29-in. Each turbine has two discs of blading turning in opposite directions, these being coupled to two three-phase alternating current self-exciting type generators having revolving fields.

Each generator is designed to be run at a speed of 3,600 r.p.m. and to give three-phase alternating current of 1,000 volts at 60 cycles per second. Each turbine, with its generators, is mounted on a surface condenser, which rests on a strong steel plate girder foundation. Each of the induction motors develops 1,360 h.p., the normal speed of rotation being 600 r.p.m.

The reduction gearing consists of a large double helical toothed spur wheel and two pinions, each of which is coupled to one of the induction motors. The ratio of reduction is about 7.5 to 1, so that the normal speed of rotation of the propeller shaft is 80 r.p.m., which corresponds to a speed of the ship about 11 knots when fully loaded.

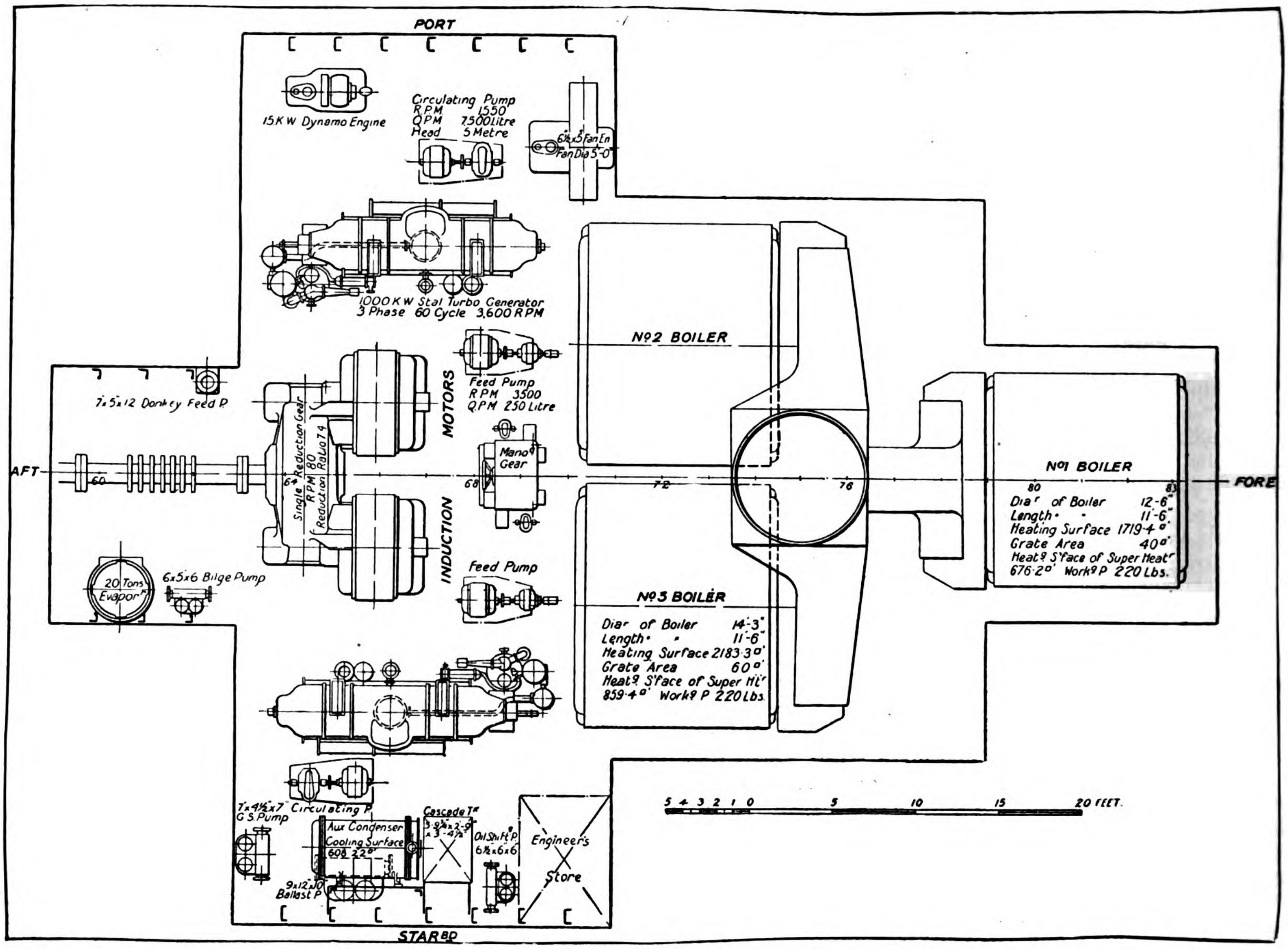
The main manœuvring gear is a rectangular pillar stand containing switches, electrometres, and the liquid type resistance, and is worked with a large hand wheel in the front.



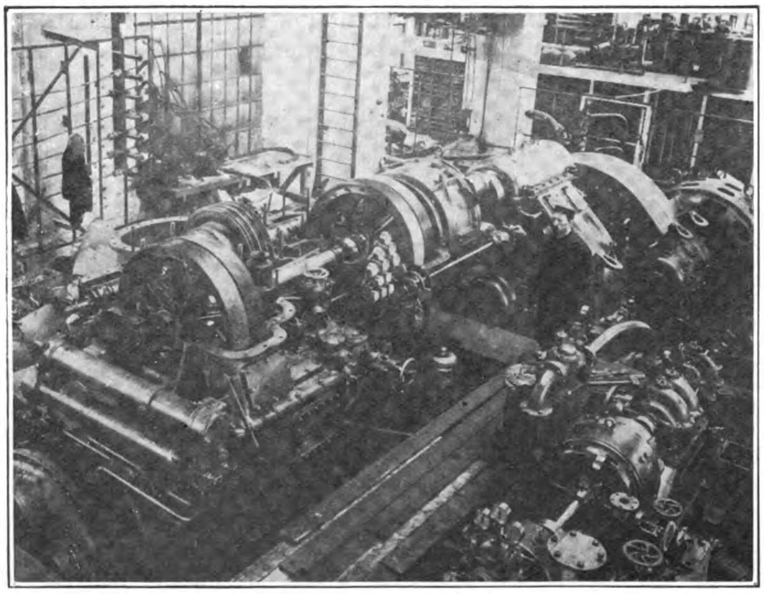
Starboard Turbo-Generator of the "Biyo Maru"

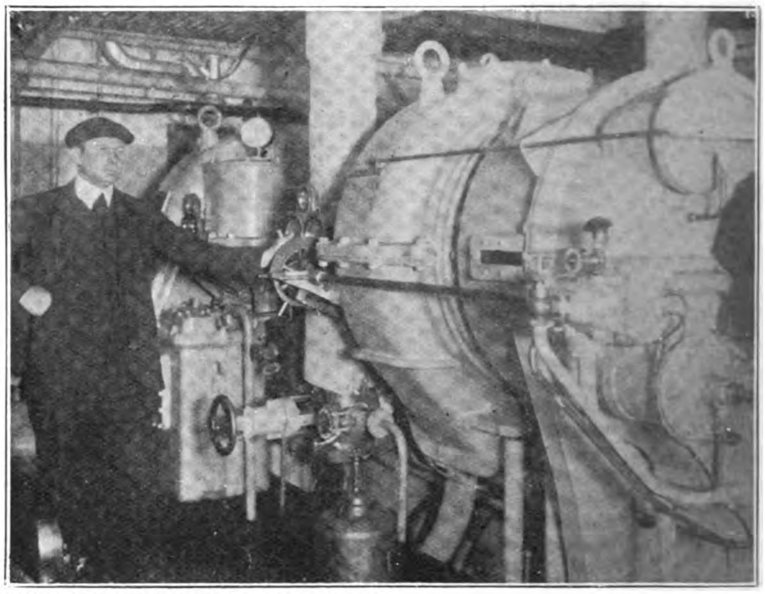
Auxiliary Machinery

The auxiliary machinery is all electrically-driven, each unit being fitted with a separate induction motor taking current from main generators. It comprises two sets of air pumps, operating on the kinetic system, two circulating pumps of the centrifugal type. The other auxiliary machinery in the engine and boiler rooms is steam-driven, and includes the following :—



General Arrangement of Machinery and Boiler Spaces of the "Biyo Maru"





"STAL" (LJUNGSTROM) TURBINE MACHINERY FOR SHIP PROPULSION

2,500 I.H.P. Turbo-Propulsion Set under Erection

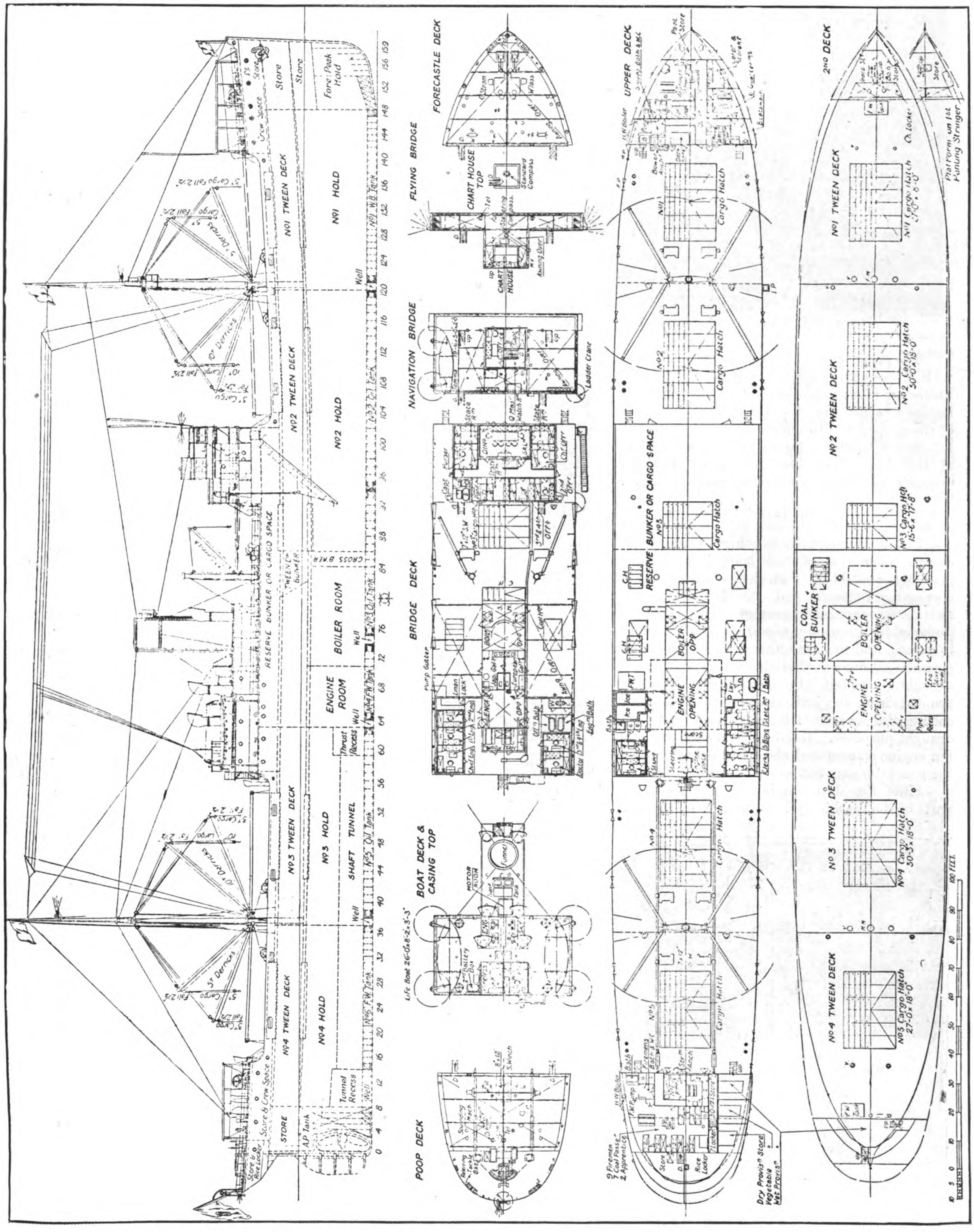
2,500 I.H.P. Turbo-Machinery installed in the s.s. "Pacific"

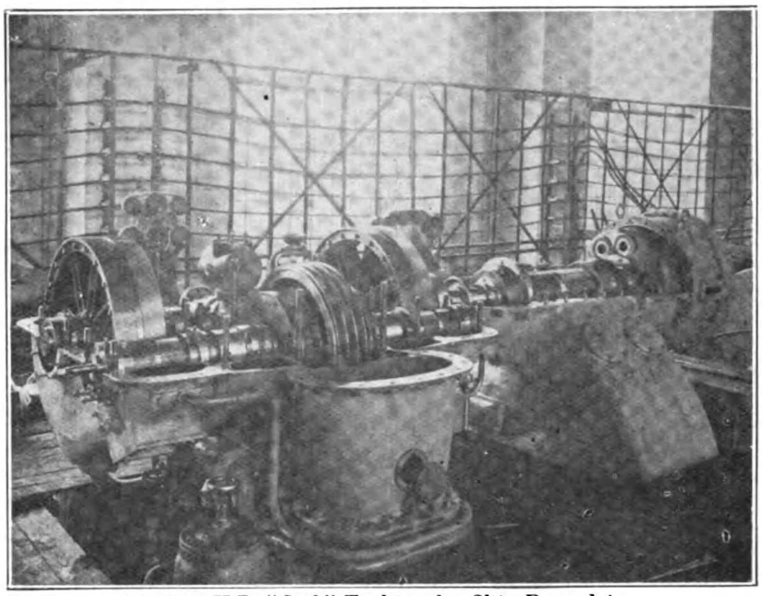
One simplex double-acting donkey feed pump, 7-in. by 5-in. by 12-in. one duplex double-acting general service pump, 7-in. by $4\frac{1}{2}$-in. by 7-in.; one duplex double-acting ballast pump, 9-in. by 12-in. by 10-in.; one duplex double-acting bilge pump, 6-in. by 5-in. by 6-in.; one duplex double-acting fuel oil pump, $6\frac{1}{2}$-in. by 6-in. by 6-in.; and a fan engine for harbor use, $6\frac{1}{2}$-in. by 5-in. In addition there is an ash-hoisting engine, evaporator, auxiliary condenser, feed-water heater, feed-water filter, two fuel oil pumps, and a small fuel-oil gravity tank.

The ship is lighted throughout by electricity, and for this purpose there is a motor generator set taking the current from the main generators. There is also a steam-driven generator for harbor use.

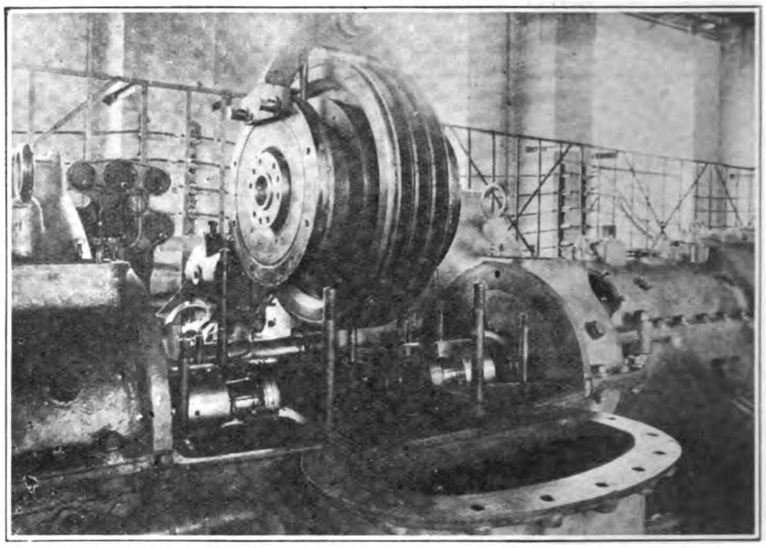
THE FIRST ELECTRICALLY-PROPELLED SHIP IN JAPAN, THE "BIYO MARU"

Built by the Asano Shipbuilding Company, Tsurumi, Japan





A 1,350 I.H.P. "Stal" Turbine for Ship Propulsion



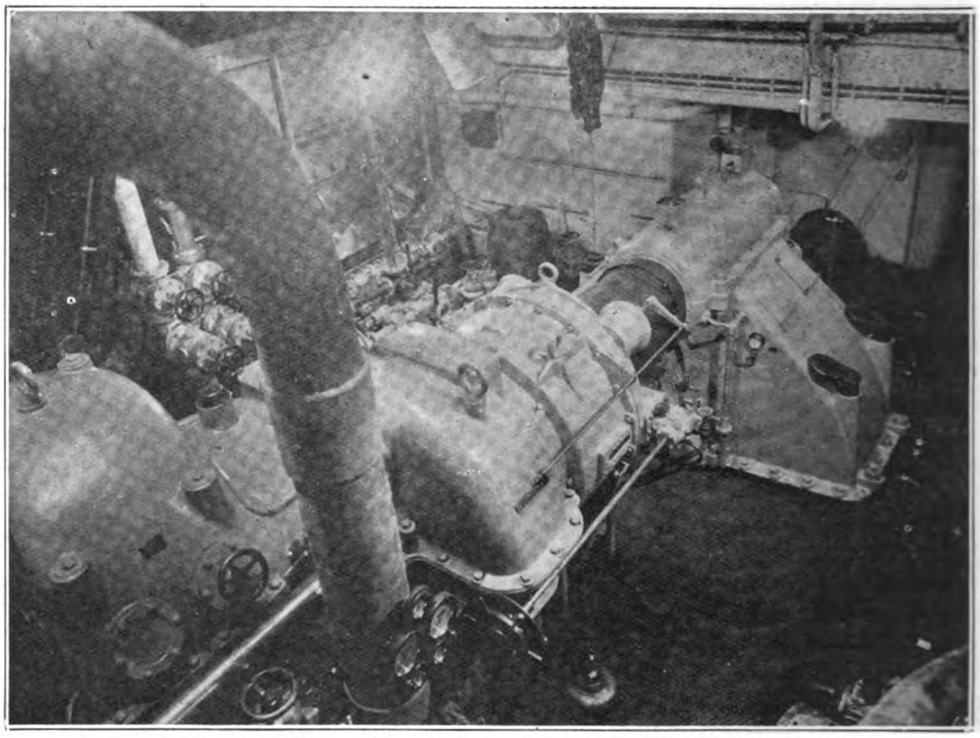
1,350 I.H.P. "Stal" Turbo-Propelling Machinery with the Blading Removed

The propeller is 17-ft. 9-in. in diameter, and with blades having a pitch of 16-ft. 1½-in. The blades are four in number, and are of manganese bronze attached to a cast-iron hub. The thrust of the propeller is balanced by means of a large ball thrust bearing attached to the forward end of the gear wheel shaft, but, in addition, an ordinary horse-shoe type thrust bearing is fitted.

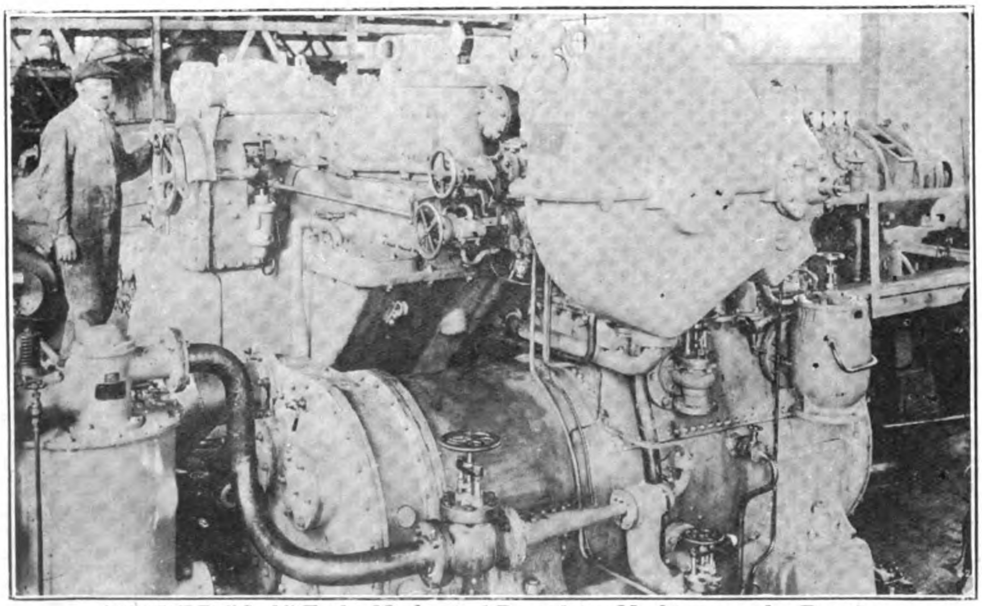
Boilers

Steam is supplied by three single-ended Scotch boilers, two of these being 14-ft. 3-in. in diameter and 11-ft. 6-in. long, having three corrugated furnaces, and one 12-ft. 6-in. long, having two corrugated furnaces. The boilers are designed for a working pressure of 225-lb. per sq. in. gauge, and to burn either coal or oil alone or coal and oil mixed. Howden's system of forced draught is adopted. For this purpose air trunks are led from the generators, the air used for cooling the generators being utilized for forced draught purposes. It is for this reason that the fan engine enumerated above is used only when the generators are not working.

Since the ship was launched, some minor parts of the machinery have undergone changes as a result of the experience gained by the engineers of the machinery builders who were attending the fitting-out of the installation, but finally early in May, 1921, she went on her trial trips. The results of the trials were very satisfactory, and the vessel is expected to run very easily over 11 knots when fully loaded, with for less consumption of coal than her sister ships, which are fitted with reciprocating engines, and this despite the fact that the *Biyo Maru* has a considerably greater cargo space and consequent increased deadweight carrying capacity in view of her reduced machinery space.



The Engine Room of the s.s. "Pacific," 2,500 I.H.P. "Stal" Turbo-Mechanical Ship Propulsion Machinery



1,350 I.H.P. "Stal" Turbo-Mechanical Propulsion Machinery under Erection

The Toyo Kisen Kaisha were among the first steamship owners in the world to make practical use of mineral oil for steam raising on ocean-going steamers, as they tried this as early as the year 1908. They now have the honor of being the owners of the first electrically-propelled merchant vessel in Japan.

Oil Fields of the Dutch Indies

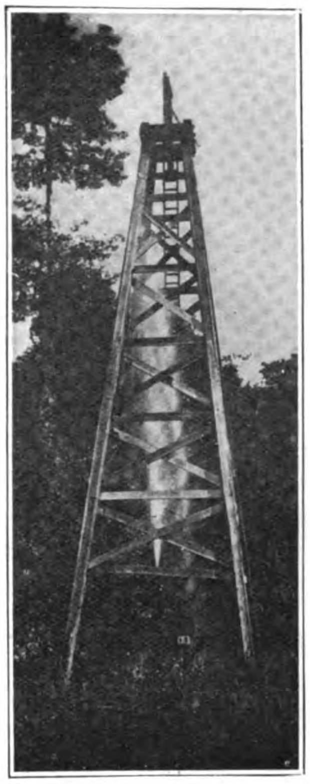
A RECENT consular report contains the following particulars of the various known oil fields in the Dutch East Indies :—

NORTHERN SUMATRA.—The Peureula (or Perlak) field, in the government of Atjeh, has a dome-shaped anticline, in which over 200 wells have been drilled. The oil-bearing strata were found at depths varying from 100 to 600 metres, the specific gravity of the oil being .770. The water-flush system of drilling was used at first, but later replaced by Canadian machinery and standard rigs. There are two pipe lines (one for oil and the other for gas), which carry the products to the Bataafsche refinery at Pangkalan Brandan, 120 kilometres away. The production in 1900 was 6,978 tons, 286,075 in 1909, 132,560 in 1919, and 129,800 tons in 1920. The concession is owned by the Perlak Petroleum Maatschappij, an independent company with headquarters at The Hague, but the field is operated on a contract or royalty basis by the Bataafsche Petroleum Maatschappij.

The Zuid Perlak concession is owned and operated by the Zuid Perlak Petroleum Maatschappij, of The Hague, also an independent company, but the output is sold to the Bataafsche refinery at Pangkalan Brandan at market prices. The production in 1920 amounted to 8,235 tons.

The Telaga Said field, in the Langkat district, is described as having a petroliferous formation, which is probably of Tertiary age, and consists of a belt of coarse, uncemented blue to grey sandstone of characteristic appearance, interstratified with marls and shales, east of the mountain range, on the slopes of which, as well as ten to twelve miles eastward on the coast, oil outflows abound. The anticline of this field, forming a dome, is about 30 kilometres in length and from 500 to 1,000 metres in width. The specific gravity of the oil is from .765 to .770. The water-flush system of drilling was used in the beginning, but later Canadian machinery and standard rigs have been used. A refinery was built at Pangkalan Brandan in 1891, since much enlarged, to which the oil is brought through pipe lines. The production from this field, however, is very much diminished.

The Boeloe Telang field is on the same anticline as the Telega Said, in the Langkat district, but the oil is heavier, having a specific gravity of .785. The owners of this concession built a small refinery on the Tandjoeng Poera River to take care of their production. In 1915 the refinery was closed down, and a contract was made with the Bataafsche Petroleum Maatschappij to take all of the crude at a reported price of 30s. per ton. All efforts to reach additional supplies of oil at lower levels on this field have failed, and it is believed to be rapidly approaching exhaustion. Various systems of drilling were used, but principally Canadian machinery.



A Sumatra Gusher

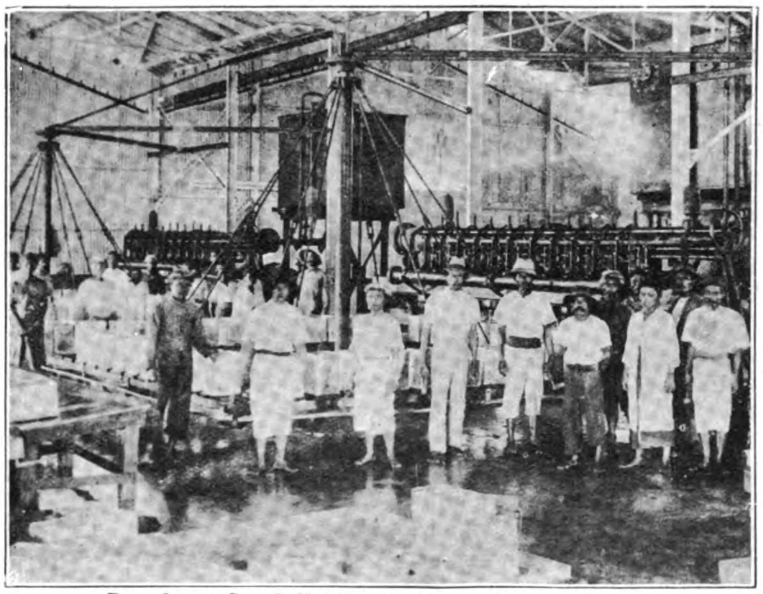
THE SOUTHERN SUMATRA FIELDS.—The most important concession in this area are the Moeara Enim, Babat, Soeban Djerigi, Soeban Boeroeng, and Ramok, in the order of their 1920 production. They are all situated in the residency of Palembang.

The Moeara Enim field was brought into production in 1900. The rights were purchased by the Moeara Enim Petroleum Mij., which company built a refinery at Pladjoe, on the Moesi river, a short distance below the town of Palembang. A pipe line was built from the wells to the refinery, a distance of 160 kilometres. The company finally came under the control of the royal Dutch group. The highest production in this field was reached in 1906, when 151,035 tons were obtained. In 1918 the production was 88,235 tons, but had increased to 104,376 tons in 1920. The field is described as being a long anticline, with petroliferous strata at depths varying from 100 to 600 metres. The specific gravity of the oil ranges from .780 to .807. Canadian and standard rigs were used, and over 200 wells were drilled, most of them producers.

The Babat field was also brought in by the same company. This area lies along the Moesi river, about 150 kilometres above the town of Palembang. It came into operation in 1901 with both flowing and pumping wells, the yield during the first year amounting to 3,730 tons, increasing to 70,690 tons in 1916, and decreasing to 59,475 ston in 1920. The oil is piped to the refinery at Pladjoe. The field is dome-shaped anticline, the oil-bearing strata being at a depth of from 25 to 200 metres. The specific gravity of the oil is .800. The machinery used in the development was largely Canadian.

The Ramok concession first came into production in 1910 with 152 tons, which had increased to 14,120 in 1920. The oil strata are

Lucy Rotary Well Driving Installation at Soengei Doea



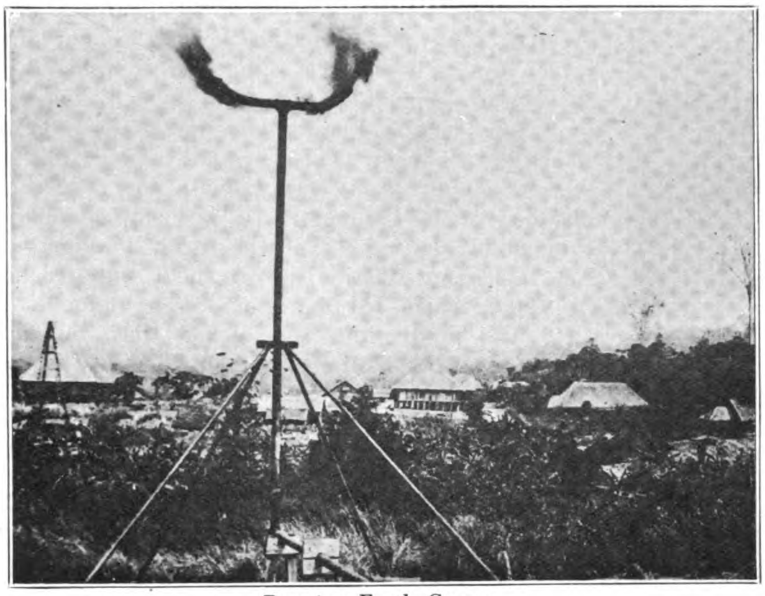
Petroleum Can Filling Apparatus at Pulau Brandan

much the same as in the Moeara Enim area. The specific gravity of the oil is .790, and the production is piped to the Bataafsche refinery at Pladjoe. Canadian machinery and standard rigs are used.

The Soeban Djerigi concession began production in 1905 with 23,266 tons, increasing to 133,695 tons in 1909, decreasing to 44,815 tons in 1914, and increasing to 66,103 tons in 1920. The oil-bearing strata vary from 100 to 500 metres in depth. The specific gravity is .770, and the oil is piped to the Bataafsche refinery at Pladjoe.

The Soeban Boeroeng concession first produced in 1914, when 340 tons were recovered. In 1920 the production was 53,329 tons. The specific gravity is .780 ; and the oil is piped to the Bataafsche refinery at Pladjoe. Canadian machinery and standard rigs were used.

THE JAVA FIELDS.—The most important producing fields in Java at the present time are Tinawoen, Panolan, Made, Djepon,



Burning Earth Gasses

and Twelve Dessas, named in the order of their 1920 production. They, are all situated in the residencies of Rembang and Soerabaja, in the eastern part of the island.

The Tinawoen concession consists of three producing fields on an anticline 1,500 metres long by 600 wide. There are five producing levels, varying from 60 to 340 metres below the surface. Up to 1917 some 184 wells had been drilled, of which 35 were producing in that year. The specific gravity of the oil is .870. The oil is piped to the refinery at Tjepoe, on the Solo river. The production in 1920 was 113,407 tons.

The Panolan concession has a dome-shaped anticline, about 1,800 metres long by 1,200 wide. There are seven producing levels, varying from 85 to 400 metres deep. Up to 1917 some 147 wells had been drilled, of which 90 were then producing. The production in 1900 was 23,536 tons, and in 1920 it had increased to 106,120 tons. The specific gravity of the oil is .850. The production is piped to the refinery at Tjepoe.

The Djepon concession's most important field is the Semanggi, the producing area of which is 1,500 metres long by about 600 wide. There are three producing levels, varying from 80 to 500 metres deep. Up to 1917 there had been 68 wells drilled, of which only four were still producing. The producion in 1900 amounted to 522 tons, which had increased to 25,899 tons in 1920, although over 40,000 tons were produced in 1917. The oil is piped to the refinery at Tjepoe. The specific gravity is .865.

The Made concession, in the residency of Soerabaja, produced 8,696 tons in 1905, 29,589 in 1919, and 31,758 in 1920. The oil is much heavier than the Sumatra product, varying from .830 to .890 specific gravity, and it is piped to the refinery at Wonokromo, near Soerabaja city.

The Twelve Dessas concession, also situated in the same residency, had a production in 1900 of 13,231 tons, 17,918 in 1918, and 19,031 in 1920. The oil is approximately of the same specific gravity as that of the Made concession, and is piped to the refinery at Wonokromo.

All of the above concessions and the two refineries are operated by the Dordtsche Petroleum Maatschappij, a subsidiary of the royal Dutch group. The N.I. Kolomiale Petroleum Mij., in which Americans are interested, have two producing concessions in the residency of Rembang-Petak, whieh produced 3,069 tons in 1920, and Tremboel, from which 562 tons were obtained in 1920.

THE DUTCH BORNEO FIELDS.—There are five important fields in this area, three of which are the largest producers of crude in this Colony—Louise, Tarakan 1., Tarakan II., Nonny, and Moeara—all operated by the Bataafsche Petroleum Maatschappij, a subsidiary of the royal Dutch company. The onere finery in this district is also owned by the Bataafsche, and is located at Balikpapan, on the east coast of Borneo. The Borneo oils are very heavy, varying in density according to the depth of the layers. The specific gravity of the top sand is .963, the middle sand .860 to .890, and lower sand .856. The Tarakan oils, however, are used for liquid fuel, and have a density of .980.

The Tarakan concessions are situated on the island of that name, off the east coast of Borneo. They came into production in 1906 with 8,065 tons, which has steadily increased until the two areas produced over 800,000 tons in 1920. The product is used almost exclusively for liquid fuel, the only process necessary for its direct use being a simple electric method for removing the slight amount of water which may be in the oil. The concessions are owned by the Tarakan Petroleum Maatschappij, and leased for operation to the Bataafsche Petroleum Maatschappij at a rate of fl.1.25 per ton.

The Louisa concession forms part of the Sanga Sanga anticline, the petroliferous strata being that described above, Between 200 and 300 wells have been drilled in this field, Canadian machinery and standard rigs being used. The production in 1916 amounted to 461,923 tons, 398,841 tons in 1917, 488,359 tons in 1919, and 454,387 tons in 1920, all of which is piped to the Bataafsche refinery at Balikpapan.

The Sanga Sanga Dalem field has an anticline some 90 kilometres in length, forming domes at two places.

The Noni (or Nonny) concession covers one of these domes at Sambodja, which produced, 1,180 tons in 1910, 198,199 tons in 1916, 152,559 tons in 1917, and 186,740 tons in 1920.

The Moeara concession covers an extension of the Sanga Sanga Dalem dome. Production was begun in 1902 with 1,366 tons, increasing to 77,595 tons in 1913, and 102,992 tons in 1920. It is operated by the Bataafsche on a royalty basis. Two new wells were brought into production on this concession during 1921, one with a capacity of 6,000 barrels per day and the other running 2,500 barrels daily.

Osaka to Have Model Public Market

With a view to relieving the high cost of living in Osaka, the Osaka municipality intends to establish a large modern market, where all sorts of daily necessaries will be sold at the lowest possible prices. A ground covering about 15,000 *tsubo* has been allotted for the purpose in Sakura-nomiya and the ferro-concrete buildings will cover an area of over 6,000 *tsubo*.

The market will be equipped in a most up-to-date manner in all respects, while arrangements will be made for the quick transportation of goods to the market from different parts of the country, by the use of the present Joto Government Railway and also of a number of motor boats on the many canals of Osaka.

The municipality has already filed an application with the central government for the loan of Y. 2,800,000 at a specially low rate of interest, which will constitute part of the funds for the above market.

Teak Milling in Siam

BY far the greater part of the forest concessions in the teak forests of northern Siam are in the hands of five European firms: The East Asiatic Co., Ltd., The Borneo Co., Ltd., The Bombay-Burmah Trading Corporation, Ltd., The Anglo-Siam Corporation, Ltd., and Louis T. Leonowens, Ltd. Most of the smaller teak concessionaires sell their logs to the mills run by these companies at Bangkok, although a few, the most important among them being Wing Seng Long & Co., operate small mills of their own. Great commercial jealousy exists between the teak millers at Bangkok, and the mills on the Menam are closely guarded lest some trade secret be stolen by a competitor.

Most of the teak trees are felled in the vicinity of Chieng Mai, northern Siam, and 75 per cent. of the logs are floated on tributaries of the Menam, sometimes taking years to reach Bangkok. About 25 per cent. of the logs float into the River Salwin, which empties into the Bay of Bengal at Moulmein. The Siamese government maintains a station at the mouth of this Burma river, in order to collect tribute of logs felled in Siamese forests.

A new concession, said to be extremely rich in large teak trees, has recently been granted the Est Asiatique Francais at Chieng Rai, near the French frontier. As the forests are situated about the head water of the Mekong, logs felled here will be floated to Saigon for milling.

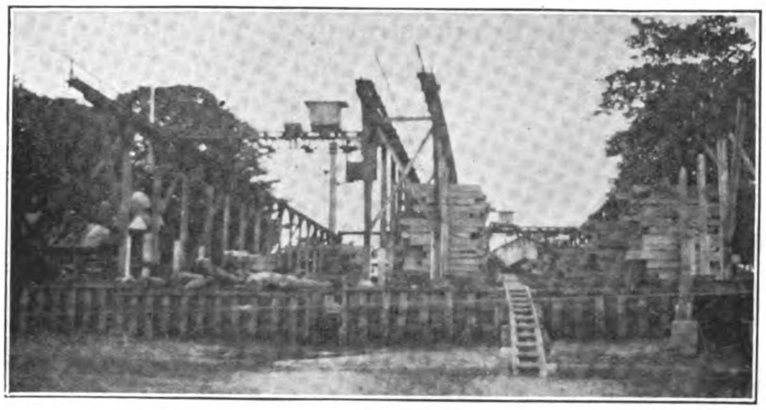
The Siamese government has recently announced its intentions of raising the royalty on teak logs by 200 per cent. The present royalty varies with the size of the log, but approximates Tics 4 per log. Bangkok teak millers immediately entered a protest, and hope to compromise on a 100 per cent increase.

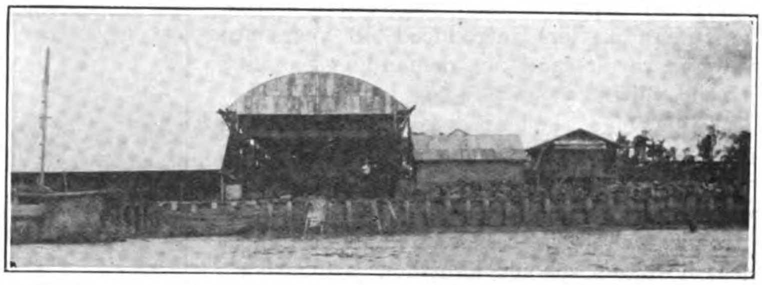
The milling of hardwood other than teak is done chiefly by the East Asiatic Co.'s mill at Bandon, and The Sriracha Co., Ltd., at Sriracha. The latter mill is considered one of the best equipped mills in the East.

During the year ending March 31, 1921, sundry harwoods exported amounted to Tcs. 1,957,683 against Tcs. 12,339,720 worth of teak. The exports of teak for three years are tabulated as follows:

Year Ending March 31,	*1919*	*1920*	*1921*	*1922*
Quantity (tons) ..	36,931	70,202	71,617	
Value (ticals) ..	5,597,409	13,420,966	12,349,720	7,111,000

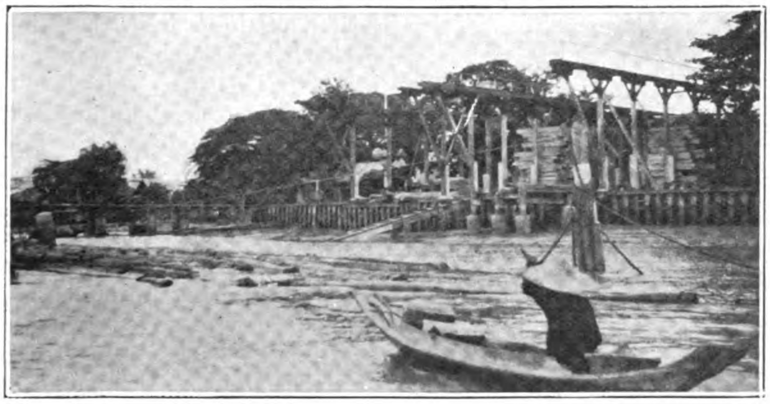
Siam teak experts attribute the slump in the teak market partly to the Washington treaties, as battleship builders were large consumers of teak.

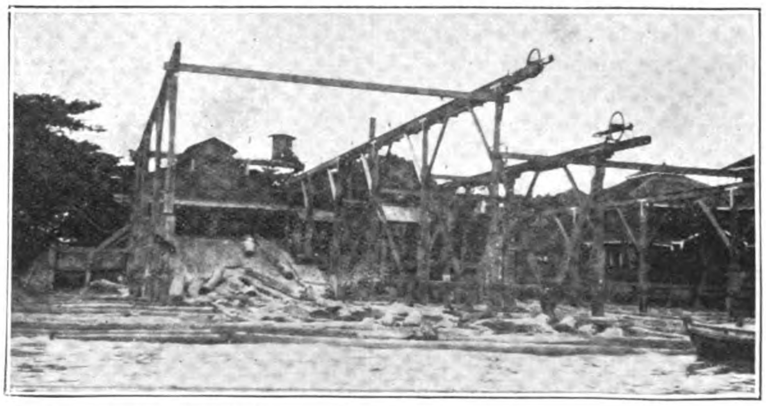




Saw Mill of the Bombay-Burmah Trading Corporation

Thye Hong Seng-Saw Mill





Teak Saw Mills of the Borneo Company at Bangkok

In the Land of the Roko

(THE FIJI ISLANDS)

Successful Administration. The Story of Thakambau. Development and Industries. The Natives. The Rokos, and Nandis. Native Government. Kava. The Meke. The Leper Island of Makongai. The Indian Settlers.

By THOS. J. McMAHON, F.R.G.S.

THE British government has been most successful in its administration of the Fiji islands. Many administrators, supported by energetic officials, have done much in promoting progress. Undoubtedly a sane policy has been maintained giving every scope to commercial development, while thoroughly protecting the interests of the natives. Nevertheless, Fiji is to-day in the throes of many problems. The white settlers are seeking freedom from official government on dominion lines. The natives civilized and educated are bidding for employment equal to their progressive status. The Indian settlers introduced 48 years are openly in revolt, and are demanding equality with the whites.

Fiji is one of the least taxed portions of the British empire, its national debt is trifling, its revenues modest in amount. And yet no island group of the South Pacific is more up-to-date in roads, wireless, cables, telephones, post offices, hospitals, schools, light-houses, transport, and other public services.

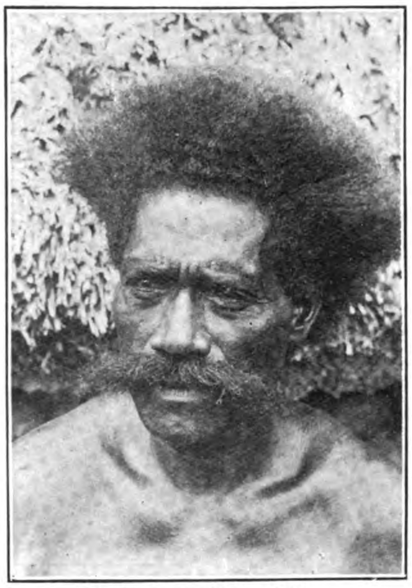
The administration has excelled in the care of the natives. Fifty years ago the Fijians were savages and cannibals, to-day all are civilized and christianized.

Fiji consists of 250 islands, 90 of which are inhabited, the total area being 7,000 square miles. There are two large islands, Vitilevu, 4,000 square miles, and Vanua, levu, 2,500 square miles. The other islands are small, but every one has a wonderful commercial value.

Fiji holds a very central position in the South Pacific, it is about equal distance from Asia, America and Australia. Suva the capital, and a fine modern city, with a magnificent harbor is like to become the half-way house of South-sea shipping.

The islands of the group are remarkably mountainous, having an important bearing on the climate, which is wonderfully cool, and healthy, the death-rate is reckoned the lowest in the world. Malaria and other tropic ailments are quite unknown.

Fiji is fast gaining a reputation as a paradise of the tourist. Mountain and river scenery particularly grand. The riding of the rapids at the heads of rivers, and in frail canoes expertly managed by natives is a thrilling experience. The natives are a picturesque race of agreeable manners, their customs and ceremonies are especially attractive.

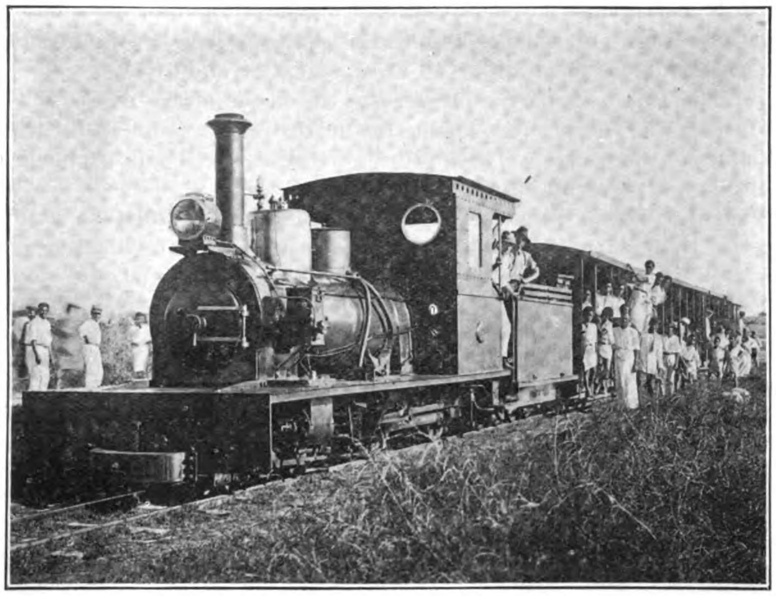


Typical Head of a Fijian

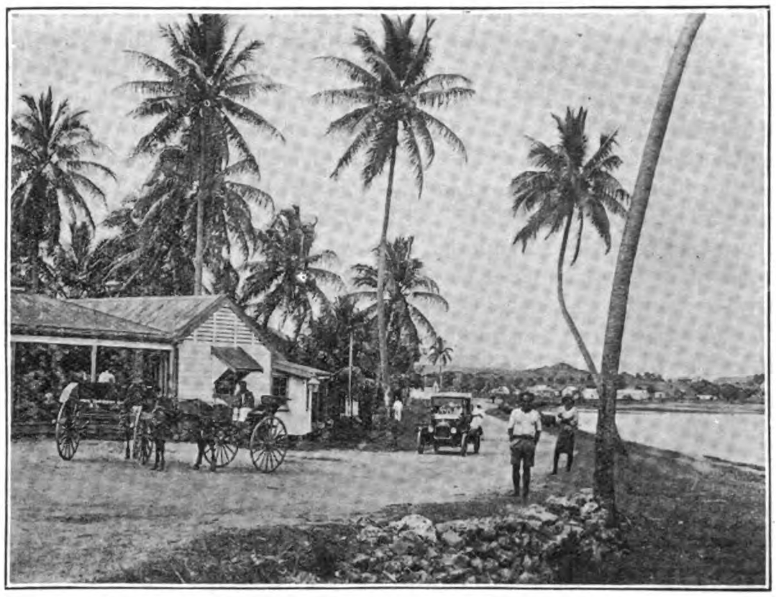
In the Sugar Field of Navua, Fiji Islands

The name of Thakambau is ineffecably written on the traditions of Fiji. In the chief city, the European settlements and the native towns there are numerous Thakambau streets, avenues, houses and institutions. Half a century ago Thakambau ruled Fiji, his name and deeds were respected throughout the South seas. He was a man of majestic figure, and most impressive commanding personality. From a mere chief of a small island and tribe, with an army of giants like himself he conquered the whole of Fiji, and set out to conquer the island groups of the South Pacific. This he did not accomplish but he succeeded in making the Fiji islands the most progressive of the South seas. He encouraged the settlement of the whiteman, and favored every kind of enterprise, but no monarch was so autocratic; he would suffer no interference with his authority. The commercial progress of the South sea kingdom brought to the king liberal revenues. Thakambau was an extravagant monarch, he delighted in rich foods, many palaces, grand furniture and splendid dress. On public occasions he would appear in a purple robe and a massive gold crown. But a day came when the revenues declined, and then serious differences arose with his subjects, culminating with an open quarrel with the American consul. The consul accused the king of inciting his native people to seize American traders' property. Thakambau denied the accussation, and the natives rose to support their king. In the midst of the hubbub the consul's house was burnt down, the consul demanded 40,000 dollars in reparation. The American home government eventually interfered, and sent a war vessel to enforce the consul's claim. Thakambu invited the British government to protect him and his people, this was refused. For some months it looked as if the Fiji islands were to pass to American ownership, when relief came to the king in two forms. A rich Australian trader paid the 40,000 dollars, and the British government after repeated petitions from the king decided to take over the Fiji islands. The first British administration was set up in 1874, and King Thakambau retired on a liberal pension to the royal island of Bau.

Development since British administration has been energetic. Travelling through the islands it is impressive to witness the variety of traffic, the stretches of settlements of whites, Fijians and Indians, the

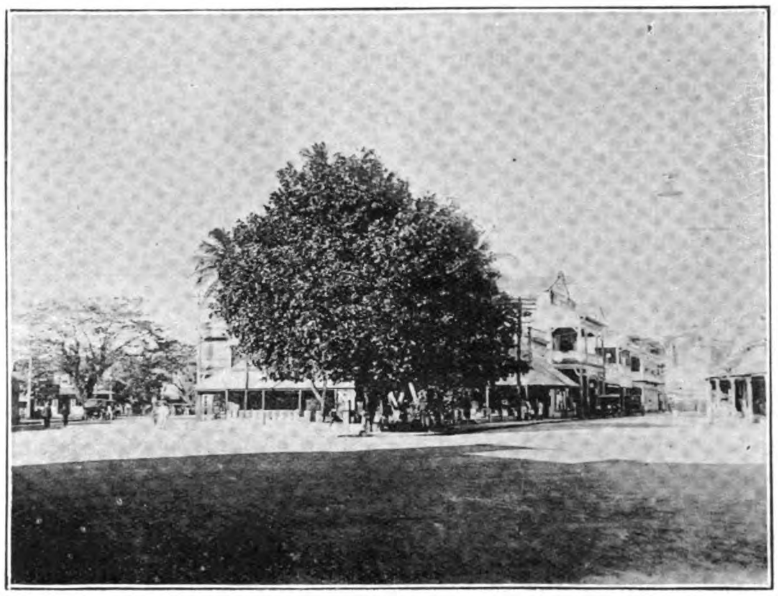


A Fiji Islands Railway Train

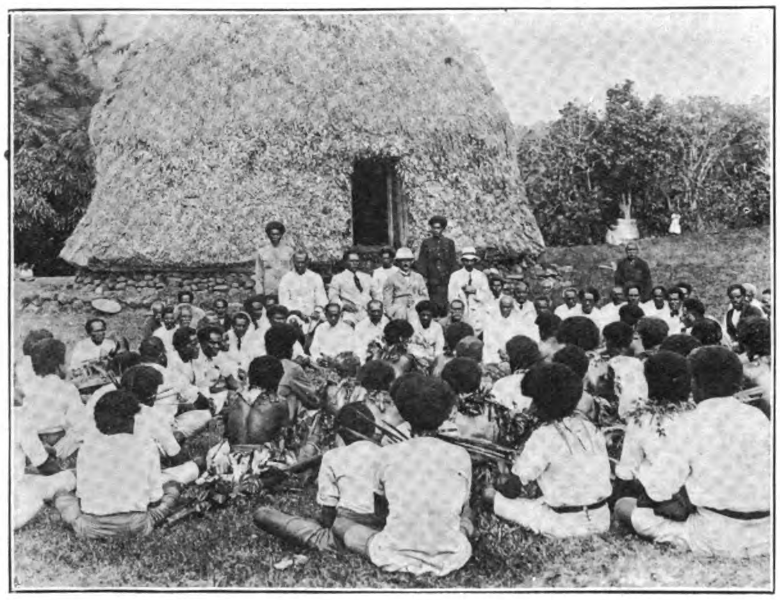


Lautoka the Headquarters of the Sugar Industry of the Fiji Islands

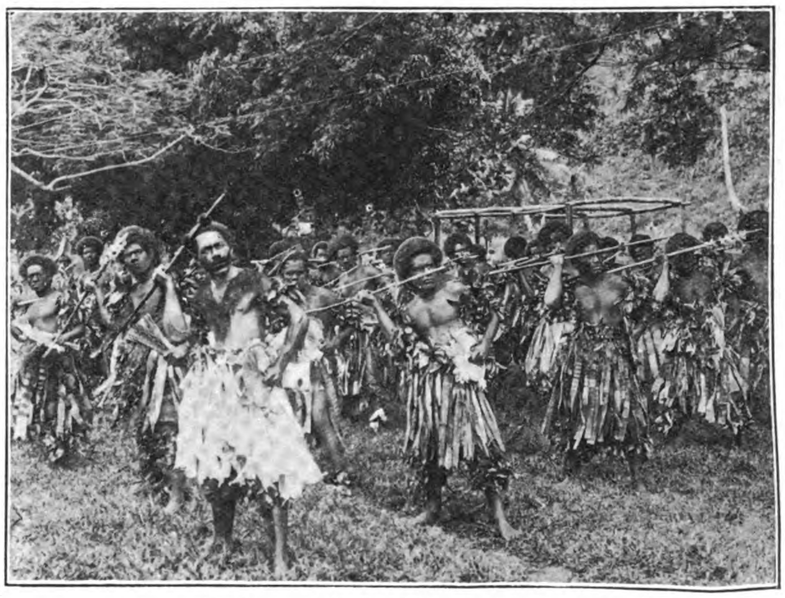
Fijian Police on March, Fiji Islands



The Broadway of Suva the Capital of the Fiji Islands



A Native Parliament, Fiji Islands



A " Meke " or National Dance, Fiji Islands

vast areas of sugar cane, the number of sugar mills, the hundreds of miles of light railways, the fine steel bridges over the great rivers.

The trade of the group is estimated at six millions sterling annually. The products are sugar, coconut, bananas and cattle. The cultivation, milling and export of sugar is the main industry, and is on a vast scale, managed on most modern conditions. The cultivation of the banana is interesting. This fruit was introduced but it instantly took on such a wonderfully rich flavor that ever since it has been termed the " Fiji " banana. Banana plantations are owned by whites, Indians, Chinese and Fijians, and altogether cover many thousands of acres. Up to twelve months ago the chief export was to Australia, but a tax upon the export, in order to protect Australian banana growers abruptly ended the trade. This was promptly taken up by New Zealand and America. Not only are bunches of bananas exported but there is a rapidily increasing trade in preserved bananas and banana flour.

In a Fiji Banana Plantation

Whole islands are given up to the cultivation of the coconut, and many thousands of tons of copra are exported every year, the planters being exceedingly wealthy.

Small as is the extent of Fiji it has some of the richest pasture lands of the Southern Hemisphere. Cattle and sheep do well. A big meat works is being erected, and dairying is being carried on most successfully.

The natives of Fiji have a race individuality, and so many superior characteristics that they are certainly one of the most outstanding native peoples of the South seas. The common folk are possessed of a natural politeness, and dignity ; the chiefs of a refinement which is unmistakable. There are 85,000 Fijians, a clean, wholesome people. Most are employed in native industries, the tilling of their gardens, many of the men owning banana, coconut and sugar planations, or work for the white men on theirs. Several Fijians hold responsible administrative positions, such as police, many are clerks in business establishments, and many are employed by the government and missions as teachers in schools. The Fijians while loyal to the British administration have a faithful reverence for their own Fijian royal family. The present representative is the Ratu Popee, a grandson of Thakambau, most cultured gentleman. Popee lives on the island of Bau in a large native "Bure" or palace, and receives guests in a drawing room furnished in the most approved European style and taste.

The Rokos or native princes are the heads of the native self-government, and are responsible to the British government for the welfare of the people. These princes are always well educated men, and have a powerful influence with the natives.

Up to recent time the women of Fiji were regarded as little better than slaves. It is a very evident sign of the civilization of the Fijians that the women are now accepted as equals. The Nandis or princesses have done much for the upliftment of the women. The Fijian woman no longer lives in neglect, she beautifies her home, dresses well in European fashion, and cares for her children in a very sensible manner.

Many Fijian customs are dying out, the younger generation are throwing off the yolk of the unprogressive custom of communism. The general ownership of wealth, food, clothing and effort is not consistent with progress, and the young Fijian is out for personal prosperity, much to the annoyance of the old men and women.

Native towns are very modern in many respects, they are laid out with streets, have water supplies and sanitation is enforced. The chief of a town is called a " Mayor," and there is a kind of municipal government which stands for progress.

The islands inhabited in the Fiji group are divided into provinces, districts and towns, and this for the interesting self-government of the natives. A Roko rules a province, a " Buli " or minor chief a district, and a " mayor " a town. The people of a town send representatives to the municipal council, this council sends representatives to the district councils, and then finally the districts send one or more representative according to population to the native parliament of the province.

A parliament is held once a year in some big town of a province, and is an imposing affair attracting thousands of natives—men, women and children, when after the closing of the parliament

The Making of Tappa or Native Cloth by Women, Fiji Islands

The Women's Quarters of the Leper Island of Makongai Island, Fiji Islands

there are great festivities for several days and nights.

A Fiji parliament is not unlike any other parliament, there is a chairman and clerk, there is much discussion on the matters of roads, schools, hospitals, taxes and the native health, the deliberations being forwarded to the British governor of Fiji who approves or disapproves as he thinks fit. The opening ceremony of a parliament is carried out with wonderful ceremonies. There is much drinking of "kava," most elaborate native dressing in tappa or native cloth, leaves, and flowers, there is much native singing, and speechifying.

No ceremony is complete in Fiji without the drinking of "kava," the native grog. This compounded from a shrub called "Yangona." The roost are crushed and mixed with water and frequently strained through a thick fibre cloth. It has a yellow-green appearance, and no particular taste. The natives drink it excessively, and many white people, long residents in the group, commend it for its medicinal qualities. In presenting a cup of "kava" a Fijian kneels and while the drink is being swallowed vigorously claps hands. An empty cup is never returned but is sent spinning into the middle of a room, the more it spins the more it shows appreciation of the compliment of being offered the drink. To be offered a cup of "kava" by a Fijian woman is the highest compliment that can be paid by Fijians.

As "kava" is the national drink, so the "Meke" is the national dance or entertainment of the Fijians. A "Meke" may be described as a legend told in song and dance. It might be of some famous tribal battle of the olden days. Hundreds of handsome young natives robbed in the most gorgeous manner take part, holding either spears or clubs, go through, with wonderful agility, grace and precision, the movements or actions of battle, and which may last for an hour or more. Women supply vocal music, by no means tuneful, but in which time is well marked.

Among the islands of the Fiji group is one of rare beauty, possessed of a remarkably healthy and untropic climate, and is known as Makongai. Here is a leper establishment where all the lepers white, yellow and black are gathered from all British South sea islands. The island is laid out in lovely gardens, and the lepers are treated in the most scientific and humane manner. Cures are frequent, and so rapidily and thoroughly is the disease of leprosy being stamped out that it is estimated in another ten years there will be no lepers in the South seas, or at least in the islands under the British.

There are in Fiji 61,000 Indians, and the number is increasing, and despite the fact they are a discontented, unhappy people. It is difficult to understand the causes of their discontent, poverty among them is quite unknown and even impossible. How prosperous they are the following details will plainly disclose:—

Some of the richest men of Fiji are Indians. In every Indian settlement are scores of Indian storekeepers, tradesmen all doing well, sharing the earnings of the Indian workers of the sugar and banana industries. An interesting evidence of Indian wealth is the quantities of jewelery worn by the women, children and often the men. It is quite common to see women weighted down with jewelery worth hundreds of pounds. The popular fashion is a necklet of Australian sovereigns, 25 and more a necklet. Tiny children can be seen playing in gutters wearing these necklets of 10 to 12 sovereigns. Every Indian owns either a motor car or a horse sulky. The owners of racehorses are mostly Indian young men.

The following particulars should prove interesting. In five vessels leaving Fiji in 1920 for India carrying only Indian passengers visiting their homeland, there traveled 4,751 adults, 1,906 children, having remittances equal to £196,389, jewelery valued at £31,891, and cash in hand equal to £8,054.

The details furnish the best evidence of the condition of the Indians in Fiji. They give the lie to the reports scattered world wide that the Indians of Fiji were, and are, little better than slaves, and that they were being exploited by the white settlers particularly the sugar companies. The Indians, it is significant while agitating against the whites and their enterprises, openly profess they will never be contented until the British government hands over to them the administration of the Fiji islands. The Fijian natives detest the Indians and are agitating that they be dismissed from the islands. With the future hol ds for Fiji is at present doubtful. The Indians are the only obstable to progress, with this obstacle overcome Fiji has a very bright and wonderful commercial future.

Municipal Improvements in Swabue

In December, 1921, the civil governor of Kwantung province directed the transformation of the old Chinese city of Swabue into a modern municipality, and appointed a returned American student (Mr. K. Y. Chan) as chief engineer of the public works department of the city. Work was begun in January, 1922, upon the construction of a 60-foot street running north and south, parallel with the water front, 4,000 feet in length. Another street of similar width, 5,000 feet in length, was begun on April 1. Three other streets are to be constructed.

Two public gardens have been laid out in modern style, with cement walks, fountains, and flower beds, advantage having been taken of all the natural beauties of the site.

Additional plans call for the construction of a wharf at the water front of Swabue, a market place, and a highway bridge (all of concrete) when financial conditions permit.

The city of Swabue is located on the South China coast about midway between Hongkong and Swatow, and is the principal small seaport between these two cities. It has an excellent land-locked harbor, which, however, will only accommodate vessels of shallow draft.

The topographic survey of a highway running north from Swabue to Haifeng city (a distance of about 15 miles) has just been completed. This highway will connect at Haifeng with the Canton-Chaochow highway and will afford a means of rapid and easy communication with both Canton and Swatow. The highway will be built at least 30 feet wide, and will be of modern construction in every respect.

The construction of the streets and highway referred to will be accomplished principally by the use of coolie labor, which is cheap, rather than by the purchase and use of machinery, which is comparatively expensive; but a steam road roller, weighing about 10 tons, will be used on both city streets and country highways, since it s impossible to operate by hand a roller of the weight required. Materials for building the streets and highway are found in abundance in the vicinity of Swabue.

NAGASAKI HARBOR IMPROVEMENT

Nagasaki's new Y.1,500,000 quay is nearing completion and will soon offer better facilities to ships calling at the port. At present cargo and passengers are handled by means of barges and tenders, but the new quay will enable two steamers of 8,000 tons each or of three of 5,000 tons each to anchor along the quay at one time. The frontage is 220 *ken* or a little more than 1,388 feet.

The cost of the quay is being borne by the city, although approximately one-third of the wharf frontage is for the exclusive use of the N.Y.K. for its Shanghai steamers. The depth of water alongside the quay is 30 feet. The widest part, at the extreme left, measures 230 feet. The part, for the use of the Nagasaki-Shanghai service boats, is to be completed sufficiently for the use of the ships by December. The accessory buildings, waiting rooms, ticket office, and baggage rooms are to be completed in February.

The ultimate plan, the completion of which require several years, is to extend this quay as far as the railroad station. The trackage will come alongside to make connections with the Shanghai boats.

Electrical Development in Japan

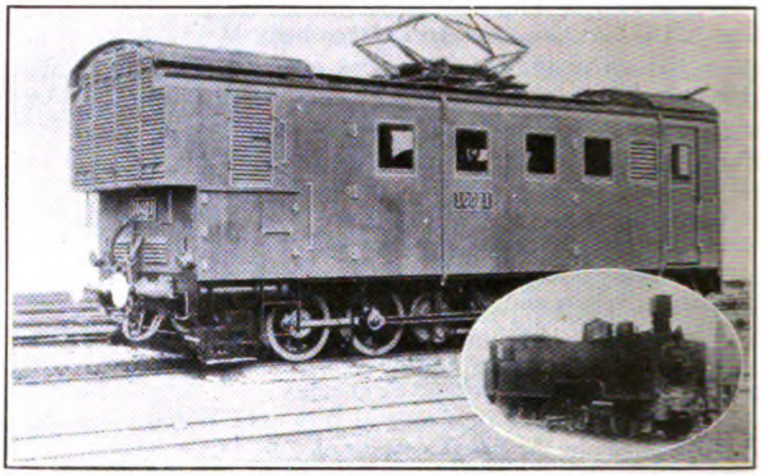
1. ELECTRIFICATION OF THE IMPERIAL JAPANESE RAILWAYS

By. H. C. Huggins

THE first Japanese steam railway to be electrified was the Kubo Railway Company's line between Nakano, in the suburbs of Tokyo, and Shohei Bashi, in Tokyo city, in 1905, before the line was nationalized. The first electrification project to engage the attention of the national railways was on the line between Yokogawa and Karuizawa, where the slope is 1/15, and in a distance of 6.9 miles there are 26 tunnels. The actual construction of this electric line was begun in April, 1910, and was completed in September 1911. Owing to many imperfections in equipment and minor mishaps during the first months of experimental operation, the completed electric line was not opened to passenger and freight traffic until May 1912.

Karuizawa is the most suitable location in Japan for a healthy; vigor-renewing summer resort. But the difficulties of the railway journey had retarded the growth of the summer community. With the electrification of this line the number of persons traveling to Karuizawa every summer has increased year after year, and the results of the electrification have always been an argument for the complete electrification of the Imperial Government Railways. Before the electrification of this line over the Usui Pass, the speed of trains was six miles an hour, and during 24 hours only 36 round trips were possible. At the present time, the average speed of electric trains is 11 miles an hour, and the average number of round trips a day is 44 ; in case of need 70 trips can be made. The transportation capacity of the line has been doubled. These results are not remarkable, but failure to achieve better results is entirely due to the poor selection of locomotives, and the inefficiencies of the locomotive engineers. The electrification, however, has proved financially most profitable.

An Electrically Hauled Train



An Electric Locomotive (inset, its predecessor)

The cost of this electrification of the Usui Pass line was extremely high, despite the low prices of materials in 1910. Including the construction costs of power plants, transformer stations, wiring, exclusive of the costs of the locomotives, the total cost of the electrification of these 6.9 miles amounted to Y.1,900,000, about Y.270,000 a mile. This high cost astonished the public, and deterred further attempts to introduce electrification on other lines.

At the time of the electrification of the Usui Pass line the government of the day, the Katsura cabinet, had an ambitious, plan to double-track the entire line between Tokyo and Shimonoseki, changing the gauge of the track from 3-ft. 6-in. to standard gauge, 4-ft. 8½-in. Electrification had not yet begun to impress the public and the politicians as the most profitable advance the nation could make toward the solution of transportation problems. For six years each successive cabinet found itself confronted with the "wide-gauge" problem, and electrification as a policy was practically unknown.

With the organization of the Hara cabinet, the "wide-gauge" policy was definitely abandoned, and the question of electrification as the national policy for improvement of transportation on the government railways again came to the fore as a question of the day.

The first expression of the importance of the question came in a government bill presented to the 43rd session of the national Diet (1919-1920), providing for a semi-governmental corporation to prepare the power equipment which would be needed by the electrification of all the railways. The scheme was grandiose, and was violently opposed by the house of peers. Opposition was so rabid that the bill was hurriedly withdrawn, and the flurried government hastily proposed a plan for the establishment of an electric bureau attached to the department of railways, which would undertake a national survey for electrification, to be carried out eventually by the government railways themselves, without the assistance of private capital.

One of the first projects approved in connection with the eventual electrification of all the national lines was the Shinano River power plant, to be built to generate 65,000 kilowatts, for transmission from the North-Eastern district to the Tokaido. The 44th session of the imperial diet approved this plan and the estimates of cost (1920-1921). Later, it was thought advisable to increase the estimates, and this change also met the approval of the diet.

The department of railways now operates three electric power houses, at Yaguchi, Yokogawa and Akabane. The hydro-electric super-power house which is to be built on the Shinano River will be the fourth plant under the department's control. The maximum water head at this power plant will be 3,000 cubic feet per second, and the power yield will be approximately 116,000 h.p. theoretically. This will be the greatest power house in Japan.

The survey of the dam site has been completed, and a light railway for transporting materials for construction has been built

to the dam site from the nearest railway station. Work on this power plant will be completed by March 31, 1927. The power generated will all be transmitted to the Tokyo district, to meet the demands for power which will be made by the electrified railway lines. Until this plant is in active operation the demand for power on the Tokaido between Odawara and Tokyo cannot be met from existing government power plants. The source of power for the new electric section is therefore being thoroughly investigated at the present time. As the line between Odawara and Numadzu through Atami is to be completed by March 31, 1926, the need for power in this section is likely to become acute before the Shinano project is completed.

The first general plan for electrification was also presented to the next session of the diet (45th—1921-1922), the "First Period Project" provides for the electrification of the following ten lines :—

1. Tokyo-Odawara
2. Ofuna-Yokosuka
3. Nakano-Kokubunji
4. Ueno-Omiya
5. Ryogokubashi-Chiba
6. Tokyo-Uyeno
7. Manseibashi-Ryogoku Bashi
8. Kokubunji-Hachioji
9. Kozu-Numadzu

(These nine lines are all in the Tokyo district).

10. Minato Machi-Shijo Nawate-in Osaka.

The first of these lines to be electrified will be those east of Kofu, the Ofuna-Yokosuka line, and the Yokohama-Odawara line, the section between Tokyo and Yokohama along the main Tokaido line having already been electrified, in part. These two lines will be completed in 1923-1924. The tunnel through the Hakone mountains now being built near the town of Atami will be completed in 1924, and the line between Odawara and Numadzu, passing through this tunnel will at once be electrified. This work will be completed in 1925-1926. So that by 1926 the whole main line of traffic between Tokyo and Numadzu on the Tokaido line will be completely electrified.

The complete electrification of the Tokaido line between Tokyo and Kobe is a pet project of the department of railways. The electrification investigating committee has prepared a plan which will be presented at the coming session of the imperial diet, if the approval of the department of finance is first obtained.

The expenditures which have been approved for electrification amount to Y.76,561,000 in all, to be used between 1921 and 1929. The present allotments of funds are as follows :

Expenses of Electrification.

	1921	*1922*
Vicinity of Tokyo	Y.1,238,000	Y.1,304,000
Yokohama-Yokosuka and Odawara	902,000	902,000
Uyeno-Omiya	265,000	264,000
Yokogawa-Karuizawa	236,000	236,000
Tokyo-Uyeno	218,000	439,000
Osaka, Minato-machi, Kata-machi, Shijo Nawate	———	236,000
Light and power equipment	492,000	443,000
Communication and signal equipment	2,710,000	2,641,000
Power plants and transformer stations	5,668,000	6,071,000
Total	Y.11,897,000	Y.12,523,000

It is reported that the complete electrification of the Tokaido line alone will cost Y.67,000,000. If the plan of the electrification investigating committee is approved, construction will be begun in 1923, and completed in 1929.

The electrification of the Tokaido line will be a comparatively simple task, once the question of power supply is settled. To equip the present track for electric traffic it is only necessary to provide the wire equipment. It is intended to use a direct current at 1,500 volts highest pressure. The third rail will be employed in tunnels. Accordingly the expense for construction is very light, but the costs of power plants, transformer stations, carriages and locomotives are exceedingly great.

To complete the Tokyo-Yokosuka (in reality only Yokohama-Yokosuka, and Ofuna-Odawara, sections, which are to be opened to business during the 1923-1924 fiscal year, the following sums have been allotted :—

ELECTRIFICATION COSTS FOR TOKYO-YOKOSUKA, AND OFUNA-ODAWARA LINE

Equipment	*1922*	*1923*
Electrification	Y.3,683,000	Y.589,000
Carriages and Locomotives	3,140,000	6,866,000
Shops	100,000	—
Total	Y.14,378,000	

The cost of carriages and locomotives is 70 per cent. of the estimates, about Y.10,000,000. According to the estimates of the electrification investigating committee 52 per cent., or Y.35,000,000 of the Y.67,000,000 estimated as the total cost of electrifying the Tokaido line between Tokyo and Kobe, will be required for locomotives and carriages. The kinds of locomotives which will be required are :

Use	Number of Locomotives	Equipment
Special express trains	9	8—250 h.p. motors
Ordinary express trains	46	6—250 h.p. motors
Local passenger and freight trains, and for switching	236	4—250 h.p. motors

Excluding the costs of carriages and locomotives the expense of electrification per mile amounts to only Y.86,000. The construction of power plants is not included in this estimate, but the costs of transformer stations are. The carriage and locomotive equipment costs are proportionately large, but as the estimated costs for improving present steam locomotive equipment on the Tokaido line may be transferred to the electrification account, the added charges on the budget are not prohibitive. It is therefore believed in the railway department that the actual cost of the entire change to electricity on the Tokaido line will fall below the Y.67,000,000 the committee has estimated.

The distance between Tokyo and Kobe on the Tokaido line is 373 miles. As the costs of electrification and rolling stock have already been budgeted for the Tokyo-Yokosuka, Ofuna-Odawara sections, the expenditure still to be approved by the coming diet is reported to be not more than Y.26,000,000.

By the electrification of the Tokaido, and later other national lines, the department of railways expects to make great and sweeping reductions in the costs of operation. The high cost of passenger traffic is the target of much attack just at this time, and a lower passenger fare is expected as one of the results of the electrifications.

Comparing the speed of electric and steam locomotives from 50 to 75 per cent. in time is saved in running passenger trains, and 20 to 46 per cent. in freight train traffic by the use of electric trains. On slopes of 1/40 or steeper, the loads of steam trains must be decreased at least 60 per cent. At present express trains on the Tokaido are pulled over the Hakone mountains by two locomotives at a speed of 15 to 16 miles an hour, carrying a load of 350 tons. This is far below the normal speed and load. With electric locomotives it will be possible to haul 420 tons at a speed of 30 to 35 miles an hour. These figures are normals, but the curvature of the track, and other engineering disadvantages may materially reduce these speeds and hauling capacities. At least the time of transit will be greatly shortened, and this will enable the railway department to operate more trains on the present trackage.

The present traffic on the Tokaido main line, which is double-track between Tokyo and Kobe, is 44 trains a day in each direction. The number of passenger trains is somewhat limited by the hours of day-time traffic, but there is no time limit to the increase in the number of freight trains which can be operated.

The department of railways has estimated the saving which can be effected by the electrification of the railways as shown in the following table :—

COMPARISON OF COST OF POWER ACCORDING TO VARIATIONS IN THE PRICE OF COAL

Price of Coal per ton.	Water power 2 sen per kilowatt hour (Index)	Coal Burning Electric Power per kilowatt hour (Index)	Steam Locomotives per kilowatt equivalent (Index)
Y.5.00	1	1.00	0.74
Y.10.00	1	1.24	1.12
Y.15.00	1	1.60	1.60
Y.20.00	1	1.80	2.00
Y.25.00	1	2.08	2.40
Y.30	1	2.40	2.90
Y.40.00	1	2.90	3.85

(Price of coal, estimated per long ton. Other figures based on (1) as business expense of using water power at 2 sen per kilowatt. Business expenses include interest on construction costs. Table compiled by Mr. Yoshiwara, of the railway department.)

It is obvious that steam power is much more economical than electric power when coal is Y.5.00 a ton. But when the cost of coal rises to Y.10.00 a ton, the expenses of hydro-electric power is about 8 per cent. less than burning coal. With coal at Y.15.00 a ton, the use of hydro-electric power effects a saving of 60 per cent. Estimating coal at Y.13.00 a ton, approximately its present price, the saving effected by using hydro-electric power, is something like 30 per cent. With hydro-electric power at 2.5 sen a kilowatt, there is still a saving of 20 per cent. with coal at its present price. It is estimated that the total amount of coal saved after the entire Tokaido line is electrified, will reach 500,000 tons a year. This will have a most interesting effect upon the whole of Japan's industrial world. But it is doubtful if the coal miners will be so greatly pleased.

The greatest advantage of the electrification from the point of saving will be in the emancipation of the railway department from the fluctuations of profit caused by the ever changing prices of coal. Operating expenses are also greatly decreased, the number of employees required for the efficient operation of electric trains being much less than is needed by a steam train.

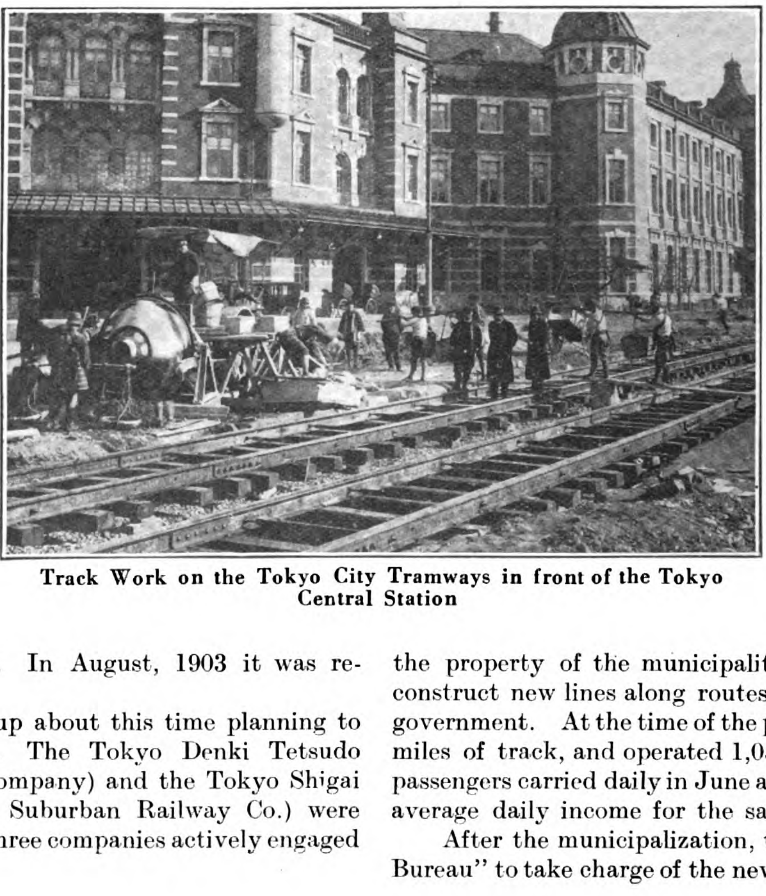
It is doubted in some circles, whether the coming diet will approve the plans and estimates for the complete electrification of the Tokaido line, as the policy of the present cabinet, decidedly tends towards economy. But in view of the fact that the electrifications are to be effected from the operating funds of the railway department, not from the general budget there seems no legitimate reason for objecting to the plan as a whole, provided the plan from an engineering standpoint has been reasonably estimated.

With the complete electrification of the Tokaido line the Imperial Japanese railways will have one of the finest railway lines in the world under its operation. Not only from the point of equipment will the line be almost ideal, but there is hardly a railway in the whole world with such wonderful scenic attractions, as the Tokaido on the sections between Kozu and Numadzu, as Numadzn as Shizuoka, and Hamamatsu to Toyohashi.

2. TOKYO CITY'S TRAMWAYS

The surface electric lines in Tokyo city were municipalized in August, 1911. Before that time they were operated by a private company which in turn was a merger of three different systems.

The first public transportation line in Tokyo was built in 1882 by the Tokyo Horse Tramway Co., between Shimbashi and Nihonbashi, through the main part of the business section of the city. Later the same company laid lines between Uyeno and Asakusa and between Asakusa and Shimbashi. In 1897, the Shinagawa Horse Car Railway Co., Ltd. built a line between Shinagawa and Shimbashi and two years later amalgamated with the Tokyo Horse Tramway Co. The merger operated 20 miles of lines, and owned 300 cars, and 2,000 horses. Traffic grew heavier with each improvement in service, and extension of line. The horse cars proved unable to handle the traffic and it was determined to electrify the lines. The company then changed its name to Tokyo Densha Tetsudo Kaisha (Tokyo Electric Tramway Co.), and relaid the track between Shinagawa and Shimbashi. In August, 1903 it was reopened as an electric line.



Track Work on the Tokyo City Tramways in front of the Tokyo Central Station

Many new companies sprang up about this time planning to engage in electric transportation. The Tokyo Denki Tetsudo Kaisha (Tokyo Electric Railway Company) and the Tokyo Shigai Tetsudo Kaisha (Tokyo City and Suburban Railway Co.) were organized and laid new lines. The three companies actively engaged in competing for public support.

During the Russo-Japanese war it became difficult to obtain funds for private enterprises, and at the same time the number of passengers decreased. There was much discussion of a uniform fare for all lines. In September 1906 accordingly, the three companies decided to merge their interests under the name of the Tokyo Tetsudo Kabushiki Kaisha (Tokyo Railway Co., Ltd.)

At the time of the amalgamation there were 89.5 miles of track in Tokyo city, on which 919 cars, including 9 bogie type, were operated. The average number of cars run daily was 642, and the average number of passengers carried was 320,749, yielding an income of Y.10,286, a day.

After the successful outcome of the movement to nationalize the railways an agitation to municipalize the tramways was started by interested persons. Negotiations with the municipality continued for two years and in 1911, the Tokyo Tetsudo K.K., with all its railway, light and power business became the property of the municipality, together with all its rights to construct new lines along routes already approved by the central government. At the time of the purchase the company owned 119.5 miles of track, and operated 1,054 cars. The average number of passengers carried daily in June and July 1911, was 533,456, and the average daily income for the same months was Y.18,468.53.

After the municipalization, the city established the " Electric Bureau" to take charge of the new enterprises. This bureau at once

TOKYO CITY TRAMWAYS

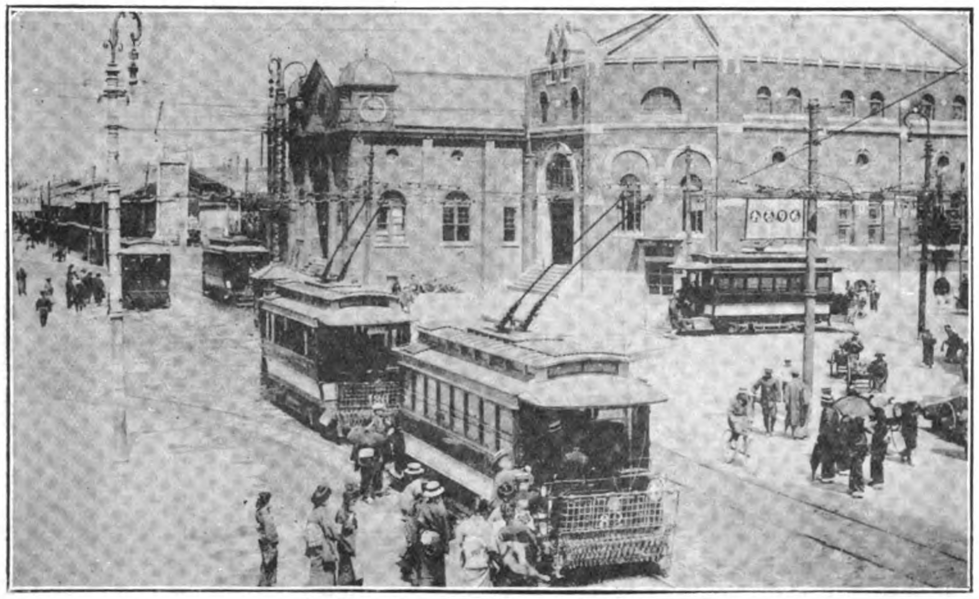
Nearly 500,000,000 passengers were carried in 1921 by the Tokyo Municipal Tramways, a daily average of 1,450,231, providing a gross income of Yen 29,766,901. A total of 1,721 cars are operated on 184 miles of track. In order to meet the pressing transportation needs of the capital, work is now being pushed on 54 miles of new double track. When completed, the number of cars in operation will be 2,050.

NIHONBASHI (THE BRIDGE OF JAPAN)—THE HEART OF TOKYO

View of the Ginza, looking South from the Bridge

Looking North from the Nihonbashi

Crowds Awaiting Transportation at Nigiwai Suda Street, Tokyo



A Busy Tramway Corner in Tokyo

began active building of the 110 miles of lines which were licensed for construction.

The number of trams in operation was also increased, and many re-adjustments of lines and services were made to increase the efficiency of the system.

A careful adjustment of service gave a great impetus to the movement of population within the city, and to the outlying districts. As these suburban districts have grown by the aid of good transportation service, the business of the railways has become increasingly prosperous.

However, because of the financial depression which began with the outset of the European war, and the consequent rise of prices in Japan, business expenses of the city railways have been greatly increased. In June 1916 the fare was raised to 8 sen for a single trip, and 15 sen for a return trip. At the same time the labor question began to effect the employees of the electric bureau, and many improvements in their condition were inaugurated by using the increase of income which was obtained from the raise in fares.

Mr. Hambei Nagao,
President of the Tokyo City Electric Bureau.

The total income of the tramways in 1921 was Y.29,786,901. Expenditure was Y.44,902,624. The number of passengers carried was 448,408,087. The deficiency in income was met by transfers of funds from other accounts, and by bond issues, and the great expenditure was incurred in order to increase the operating lines in the city.

At the end of May 1922, the bureau controlled 183.857 miles of track, and operated 926 bogie cars, 795 small type cars, 1,721 cars in all. The daily average of passengers carried was 1,450,231 for the year, and income was Y.95,935.90. The number of cars operated daily averaged 1,427, and the number of miles run a day was 130,570. The number of employees on the cars and tracks was 11,055.

Mr. Tsutomu Saito,
Director of the Tokyo Municipal Council, Electric Section.

The city of Tokyo has invested in its electric railways Y.105,910,000. The city to cover the costs of the railways up to the end of June, 1922, has issued bonds as follows:

1912: *Municipal Ordinance Nos. 2 and 3.*

Bonds for Electric Enterprises.

Issued in	Amount Issued	Amount Redeemed
Great Britain ..	£3,175,000 }	£590,700
United States ..	2,000,000 }	
France	Frc. 100,880,000	Frc. 8,177,500

Amount Outstanding.

Great Britain and U.S.A. Issues	£4,584,300
France	Frc. 92,702,500

Issue price: G. B. and U. S. A. £93 and £93½.
France .. .. Frc. 92

Annual Interest: 5 per cent.

Interest Paid: March and September; Term of redemption.
To begin: September, 1916.
To be completed: March, 1953.

1914: *Municipal Notification No. 2.*
Second Issue Electric Enterprise Bonds.
"I"
Issued in Japan to the amount of Y.10,000,000.
Y.533,500 has been redeemed leaving Y.9,466,500 outstanding.

Mr. Chikatami Soyama,
Engineer-in-Chief of the Tokyo City Tramways.

The yield on issue was Y.93.50.
Interest: 5 per cent., payable in June and December.
Redemption began December, 1921, and will be completed by November, 1937.
"Ro."
Issued in Japan to the amount of Y. 5,000,000.
The yield on issue was Y.90.00.
Interest: 5.5 per cent., payable in March and September.
Redemption began April 1922, and will be completed in May 1954.

1920: *Municipal Notification No. 68.*
Short Term Bonds for Electric Enterprises.
Issued in Japan to the amount of Y.10,000,000.
The yield on issue was Y.94.00.
Interest: 6 per cent., payable in May and November.
Redemption began May, 1921, and will be completed in May, 1925.

Mr. Genryo Masuda,
Director of the Tokyo Municipal Council, and Electric Section. Former Engineer-in-Chief who designed the present tramway system.

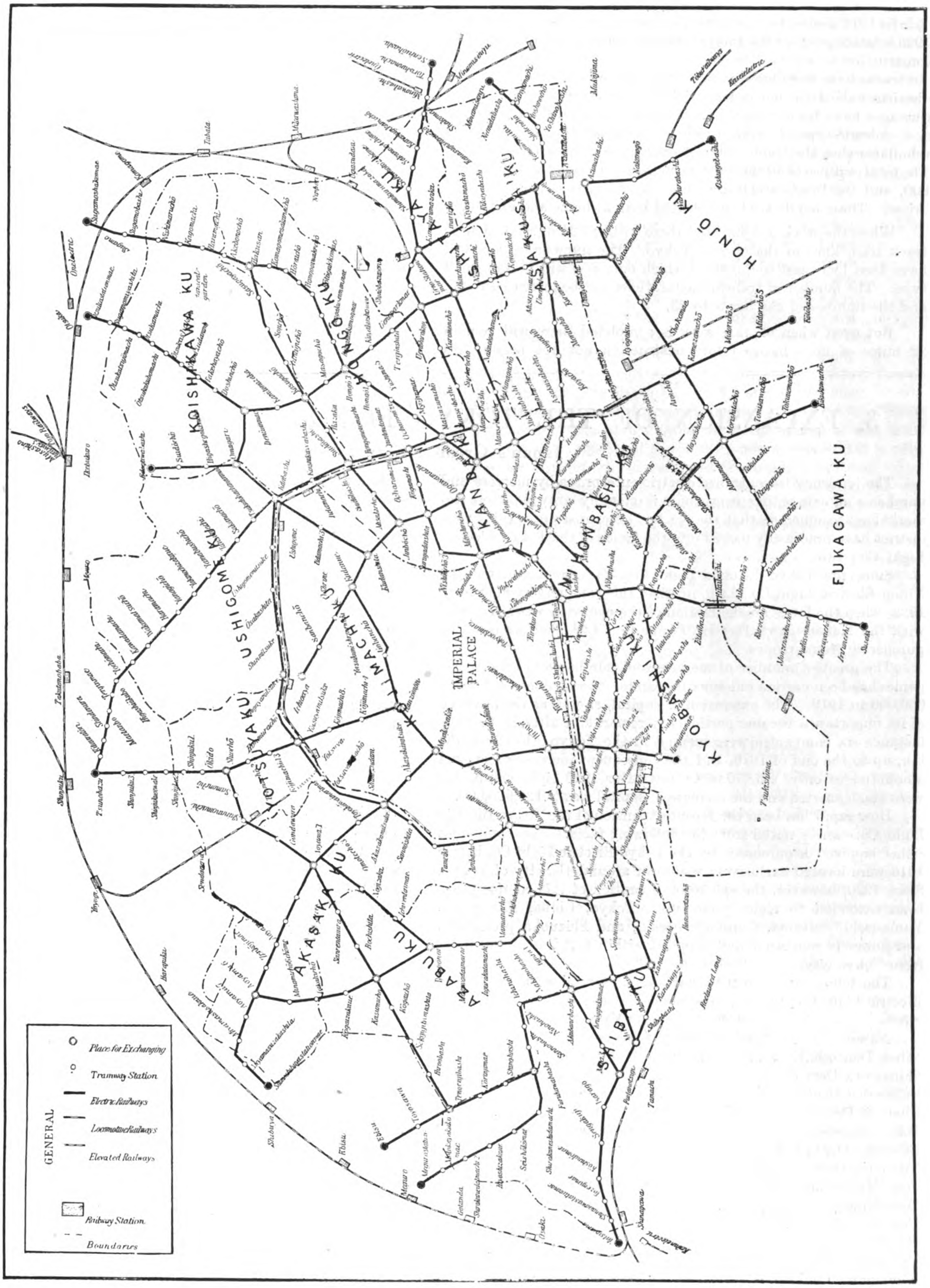
1921: *Municipal Notification No. 61.*
Second Issue, Short Term Bonds for Electric Enterprises.
Issued in Japan to the amount of Y.15,000,000.
The yield on issue was Y.93.00.
Interest: 6 per cent., payable in May and November.
Redemption to begin in April, 1922, and be completed in April, 1926.

The tram lines in Tokyo city are gauge 4 feet 6 inches, and the rails are of various weights, 75.92 and 100 pound rails being the principal weights. The bureau owns 458 wooden wire supports, and 8,894 steel supports, exclusively for the use of tramways. The steel supports were manufactured by the National Company.

Ordinary D.C. Railway motors, manufactured by Dick, Kerr & Co., the General Electric Co., The Shibaura Engineering Works, the Mitsubishi Dockyard Co., are installed on the trams. The small cars are equipped with two motors of 25 h.p. each, and the bogie type cars carry either 2 motors of 35 h.p. each, or 2 of 50 h.p. each.

The city purchases power from the Kinugawa Hydro-Electric Power Co. In May 1922 the city used 220,364 kilowatts, which was handled by transformer stations throughout the city. The city owns a coal-burning power plant at Shinagawa where 5,600 kilowatts are generated for reserve in case of need. The bureau owns 11 car barns in different parts of the city.

SKETCH MAP OF TOKYO TRAMWAY SYSTEM



In 1918 a plan for continuing construction to be completed in 1925 was adopted. Of a total of 86 miles of new lines licensed for construction 54 miles will be completed in the very near future. The old tracks have been greatly improved, and in the important traffic districts have been newly laid with 100 pound groove rails. Old carriages have been replaced on the main traveled lines with the newest bogie type of cars. Bridges throughout the city are being rebuilt so that the trams will not crowd the normal street traffic. The total expense of all the improvements is estimated at Y.132,300,-000, and the funds are being raised by bond issues as the need arises. These bonds are being floated both at home and abroad.

When the work is completed there will be 224 miles of double track tram lines in the city of Tokyo. The number of cars will have been increased to 2,050, of which only 600 will be the small type. The number of transformer stations will be increased to 25, and the number of car barns to 23.

But even when all this work is completed there will remain 32 miles of lines licensed for construction not yet begun. As population increases the traffic grows, and it is expected that work will be commenced on these licensed lines as soon as the widening of the city streets has been effected in accordance with plans recently adopted by the municipality. The municipality will seek new licenses to construct lines along streets now being widened in the most crowded districts.

The population of Tokyo and neighboring towns and villages has grown since 1913 as follows:

		Population	Number of Passengers Carried in Tokyo Trams
1913	..	2,393,450	245,742,663
1914	..	2,493,040	257,098,627
1915	..	2,655,572	261,738,064
1916	..	2,733,456	264,703,419
1917	..	2,861,326	296,211,645
1918	..	2,871,234	336,703,721
1919	..	2,973,861	395,199,537
1920	..	3,058,392	400,636,035
1921	..	3,168,145	448,408,087

3. EXPANSION OF THE TOKYO ELECTRIC LIGHT COMPANY

Japan's Greatest Corporation

The tendency to centralize electric enterprises by mergers and purchases of competing companies is steadily growing more remarkable; so much so that the electric enterprises in the Kwanto district have practically passed into the hands of the Tokyo Electric Light Co., Ltd.

Since the Tokyo Electric Light Co., Ltd., amalgamated the Nihon Electric Light Co., Ltd., in 1890, this company by February, 1922, when the latest amalgamation of the company was concluded with the Katsuragawa Electric Power Co., Ltd., had annexed or purchased 14 companies.

The greatest number of mergers and purchases of other companies has been carried out since its capital was doubled to Y.100,-000,000 in 1919. The expansion of capital, as well as the advance of its importance became particularly remarkable after 1920. For instance six companies were merged in the Tokyo Electric Light Co., up to the end of 1916, and the consequent increase on capital amounted to only Y.6,770,000. But after 1920 eight companies were amalgamated and the increase of capital was Y.122,990,000.

How rapid has been the recent expansion of the Tokyo Electric Light Co. can be noted from the following facts. The companies either annexed or purchased by the Tokyo Electric Light Co. before 1916 were located exclusively within or around the city of Tokyo. Since 1920, however, the sphere of operation of this company has been extended to eight prefectures, Tokyo, Chiba, Kanagawa, Yamanashi, Saitama, Gunma, Ibaraki, and Shizuoka prefecture, and power is generated and supplied within a radius of 100 miles from Tokyo city.

The following companies have been merged with the Tokyo Electric Light Co., in the course of its history:—

Name	Value accepted	Date of merger.	
Nihon Dento K.K.	Y.300,000	Jan.	1890
Shinagawa Dento	225,000	Aug.	1902
Fukagawa Dento	150,000	Sept.	1906
Hachioji Dento	15,000	Jan.	1906
Tokyo Denryoku, K.K. (Power Co.)	6,000,000	May	1907
Edogawa Denki K.K.	80,000	Dec.	1916
Nihon Dento K.K. (another company)	24,000,000	March	1920
Tone Hatsuden K.K.	22,000,000	April	1921
Tone Kido (Tramway) K.K.	240,000	April	1921
Yokohama Denki K.K.	20,000,000	May	1921
Daini Toshin Denki K.K.	5,000,000	Oct.	1921
Takasaki Suiryoku K.K.	8,500,000	Feb.	1922
Kumagawa Denki K.K.	750,000	Feb.	1922
Katsuragawa Denryoku, K.K. ..	42,500,000	Feb.	1922

As a result of these continuous amalgamations and purchases the authorized capital of the Tokyo Electric Light Co., Ltd., reached Y.222,000,000 in October, 1922. Compared to 1890 when the merger with the first Nihon Electric Light Co., Ltd., was made, the authorized capital has increased 500 times. One thing that must not be overlooked in this expansion is that the increase by amalgamation alone has amounted to Y.129,760,000.

In keeping with the expansion of capital, the capacity of supplying power of the Tokyo Electric Light Co., has made a great stride. In November, 1914, on the basis of 100 for November, 1910, the index for power generated had increased to 2,080; at the end of May 1922 it had reached 4,600. The fact that the increase in electric lights supplies was only 260 per cent. shows how great has been the increase in the power supply.

(2) *Index of Power and Lights Supply.*

	May end 1916	Nov. end 1919	Nov. end 1921	May end 1922
No. of lights	113	139	238	262
No. of houses	107	118	214	239
Motors (h.p.)	137	296	489	541
No. of houses	128	280	563	614
Power gene. equipment (converted into kilowatts)	496	2,082	3,698	4,604
No. of houses supplied ..	143	500	1,294	1,565

Note.—This study is made on the basis of 100 for November end 1914.

At the end of May, 1914 the Tokyo Electric Light Co. generated 44,000 kilowatts of which only 656 kilowatts were sold to others. During the war the supply of power increased immensely, but as the company then engaged chiefly in supplying power in large quantities only, the number of companies, as well as the area of supply, was not so great as it is to-day. The names of companies and amounts of power they use from the Tokyo Electric Light Co., are given in the following table. May, 1922:—

Keio Denki (tramway)	500 Kw.
Kinugawa Denki (from main office)	7,650 „
Kinugawa Maebashi branch	5,550 „
Keisei Denki (tramway)	670 „
Akigawa Suiryoku	50 „
Joto Denki (tramway)	100 „
Saibu Kido (tramway)	150 „
Ikegami Dentetsu	100 „
Fuji Gas Beseki	4,000 „

Yokohama Shiden (municipality)	750 Kw.
Teikoku Dento (7 places)	2,255 ,,
Honjo Denki	50 ,,
Ryomo Denki	30 ,,
Azuma Kido (tram)	150 ,,
Sosha Suiryoku	150 ,,
Nishigami Denki	100 ,,
Karasugawa Denryoku	350 ,,
Nihon Denki	120 ,,
Tsuru Dento	580 ,,
Kyoto Denki (tram)	50 ,,
Saitama Dento	600 ,,
Gyoda Dento	350 ,,
Kasukabe machi, Denkibu (town)	60 ,,
Chiba Dento	1,270 ,,
Ditto (uncompleted)	300 ,,
Shimotsuke Denryoku (two places)	230 ,,
Ishioka Denki	326 ,,
Musashi Dentetsu (railway)	3,500 ,,
Aiko Denki (unfinished)	40 ,,
Kofu Denryoku (ditto)	300 ,,
Tokyo-shi Denki Hyoku	8,500 ,,
Ditto (unfinished)	1,150 ,,
Keihin Dentetsu (rail)	4,200 ,,
Tanimura Dento	30 ,,
Katsura Dento	80 ,,
Gunma Denryoku	100 ,,
Total	44,391 ,,

The power generated by the company's power plants is given in the following table :—

	Capacity in Kilowatts		Power received
Main office	61,600	Reserve : 12,000	33,750
Yoko. prma branch	14,525	5,550	9,500
Maebashi branch	14,343	—	4,500
Old Katsuragawa	30,886	10,000	1,800
Old Takasaki Suiryoku	3,355	—	2,000
Old Kumakawa Denki	3,657	—	—
Total	128,366		51,550

Note :—This study is made on the figures of end 1921, according to the highest capacity.

The Tokyo Dento supplies 34 large companies with all their power, and their total consumption is 44,390 kilowatts, about one-third of the company's total generating capacity, which is 124,460 kilowatts.

This company is said to be considering amalgamations with many other companies operating in the Kwanto districts. At the present time, in capital, and influence, it is Japan's greatest corporation.

Cement Industry in Japan

DOMESTIC cement manufacturing companies in Japan number as many as twenty-three now, being equipped with Y.43,-000,000 in all and they have made such a development that their products will be calculated by 10,000,000 barrels as a unit.

When the economic world was in a prosperous condition, the cement industry began to prosper, though the manufacturing costs rose steadily due to a steep ascent of sundry expenses, but as the demand for cement increased and its market price rose to Y.16 a barrel, the cement industry developed steadily. The market then began to show a downward tendency and the demand for cement suddenly decreased in volume, causing its market price to steadily decline until cement manufacturers were obliged to enter into an agreement for curtailing their products by 30 per cent.

Since last autumn, the tide has turned, not only was the stock of 800,000 barrels quickly disposed of, but its market price reached Y.7.8 a barrel.

The cement production figures for 1921 are still unknown, but it is believed to have amounted to no less than 8,200,000 barrels, and the production of this year is estimated to amount to 9,000,000 barrels.

For the sake of comparison, the following figures of production and sale during the past thirteen years are listed in decimals of 1,000 barrels.

Year	Amount of production	Sold	Carried over to next year
1909	2,541	2,136	771
1910	2,638	2,751	659
1911	3,193	2,370	482
1912	3,804	3,305	981
1913	3,742	3,678	1,044
1914	3,625	3,861	809
1915	3,943	3,943	809
1916	4,495	4,747	557
1917	5,502	5,483	576
1918	6,640	6,758	458
1919	6,445	6,236	666
1920	7,852	7,767	894
1921	[8,300]	7,900	934

(The figure bracketed is a rough estimate.)

As shown in the above table, both the amounts and sales have trebled since 1909, and as for the amount exported it is only about 20 per cent. of the total amount produced.

The countries to which Japanese cement are exported are listed below with the annual exports in decimals of 1,000 barrels.

Year	China	Kwantung Province	British India	Britsh Straits Settlement	Dutch India	Philippine Islands	Hongkong	Total
1913	9.7	101.6	5.9	1.8	0.1	36.5	1.2	156.8
1914	22.1	98.3	19.0	6.8	16.6	72.7	9.7	262.7
1915	51.5	26.6	211.8	41.5	121.1	129.9	9.1	703.8
1916	81.2	69.9	147.1	70.3	192.8	94.9	—	678.7
1917	35.9	62.6	83.3	44.6	263.3	23.8	1.1	528.6
1918	36.0	185.3	78.4	106.1	384.8	82.7	—	907.8
1919	65.5	413.6	92.7	46.9	243.4	130.9	—	1,005.0
1920	80.2	161.4	39.6	64.2	429.2	386.6	—	1,161.2
1921	168.1	178.9	122.1	14.3	311.8	159.6	—	996.2

Chosen Railways in Distress

Without exception, railway companies in Chosen are now in distress, owing to tightness in money circulation. The present state of railway enterprises is reported to be as follows :

1. The lines now in full operation are four in number, including the Zenhoku-Kannan, the Chosen Gas Electric, and the Fusan-Torai Railways.
2. Those with only a part of their construction completed are five, viz., the Chosen Central, the Chosen Shokusan, the South Chosen, the Keinan, and the Tomon Railways.
3. Those now under construction are also five in number, viz., the Sanyo, the Ryoko, the Takurin, the Shinrin, and the Kongosan Electric Railways.
4. Those whose construction has been permitted by the government, and the enterprises launched are three, the North Chosen, the Keishun Electric Railways, and one other.

When the construction of all these railways is completed, the total mileage will reach 1,675.4 miles. But the mileage, now being operated upon, is only 286.7 miles ; while that of lines now under construction amounts to 89.5 miles, and that of those, the construction of which will shortly be begun, reaches 155.6 miles. As to when the remaining mileage will be constructed is as yet unascertainable.

The cause that has brought about these results is the tightness of money circulation in the peninsula. The railway companies are invariably in distress, due to the same reason, as raising funds is now impossible, the shareholders strenuously objecting to paying up, when the market prices of shares are far below the amount already paid up.

Growth of Large Banks in Japan

WITH the commencement of the European war there was more than one precedent smashed in Japan. Business conditions were unprecedented, and the prosperity of the money market also became unprecedented. This development of the money market falls into two parts: the development of organs of circulation, and improvement in methods of transactions. The development of the banks belong to the development of the organs of circulation. The beginnings of the use of call money, the extension of discounts, and the issue of debentures fall under the improvement in transactions. There is naturally a great connection between the two. For instance as the banks developed, their reserves were placed on the money market, and discounts were re-discounted and the proceeds reinvested in the money market. Then as the market developed the banks expanded their transactions. Accordingly if one wishes to understand the development of the money market in Japan during the war, one must study both manifestations. In this article, however, only the development of the banks will be discussed.

The Bank of Japan, Tokyo

The most noticeable feature of the bank history during the war is the decrease in the number of companies engaged in banking business. Before the war there were 52 special banks, semi-governmental institutions, and 1,614 ordinary banks, and 684 savings banks. Of the savings banks, 159 were only savings departments of ordinary banks, so that the number of banking institutions was only 2,155 in all. This seems an extraordinarily large number, but the reason for the existence of so many banks is not hard to discover. It was popularly believed that the banking business in Japan involved no risks to investors, and the business was also socially one in which the sons of gentlemen could engage. The government was also strongly in favor of the establishment of banks, and put practically no limit on the number of licenses it would issue. Furthermore, before the war, there were only a few men in all Japan who were at all capable of organizing and operating great banking businesses, so that the number of small banks was remarkably great.

With the continuance of the war there came a great advance in the commercial and industrial needs of Japan, and great amounts of capital were required almost at once. The government then became urgent in its requests that small banks amalgamate their interests. The number of banks began decreasing every year after 1914.

Year	Special Banks	Ordinary Banks	Savings Banks	Total
1913....	52	1,614	648	1,155
1914....	52	1,593	1,658	2,153
1915....	52	1,442	657	2,153
1916....	52	1,427	664	2,143
1917....	52	1,398	664	2,114
1918....	52	1,375	661	2,088
1919....	52	1,344	656	2,052
1920....	52	1,326	661	2,039
1921....	52	1,329	655	2,036

(This list is from the annual report, 1921; bureau of banks, department of finance. Issued June 30, 1921).

(Savings banks—include savings departments of ordinary banks).

Before the war the concentration of banks was just beginning. But with the continuance of the war, the tendency to amalgamation became more and more conspicuous. At the end of June, 1921, there were 2,036 banks, a decrease of 139, since 1913. Many dissolutions were also carried out in those years but the merging of banks of small capital in large capital organization was the real cause of the decrease in the number of banks effected during the past nine or ten years.

While the number of banks was decreasing the number of branch offices was rapidly being increased. For instance, before the war, the number of branch banks in Japan was 3,153; by the end of 1918, they had increased to 4,181, and to more than 5,000 in 1920. At the end of June, 1921, there were 5,277 branch banks in Japan, an average of 1.5 branches to each main bank in 1913, increased to 2.6 branches in 1921.

Year	Main Offices	Branches	Number of branches to each main office.
1913	2,155	3,153	1.5
1914	2,153	3,352	1.6
1915	2,151	3,430	1.6
1916	2,143	3,731	1.7
1917	2,114	3,891	1.8
1918	2,088	4,181	2.0
1919	2,052	4,589	2.2
1920	2,039	5,097	2.5
1921 (June) ..	2,036	5,277	2.6

Naturally with the increase in the number of banks the amount of capital invested in the banking business greatly increased. Before the war the total capital of all the banks in Japan was Y.886,000,000, the average for one bank being Y.411,000. In 1917 capital had increased to 1,152,000,000, average for one bank, Y.546,000. By the end of June, 1921 the total capital had reached Y.2,696,000,000, and the average capital for each bank was Y.1,325,000.

Year	Number of Banks	Authorized Capital	Average one Bank.
1913	2,155	Y. 886,668,000	Y.441,000
1914	2,153	932,425,000	433,000
1915	2,151	949,303,000	441,000
1916	2,143	971,877,000	454,000
1918	2,088	1,314,408,000	629,000
1919	2,052	1,803,547,000	879,000
1920	2,039	2,643,433,000	1,296,000
1921	2,036	2,696,809,000	1,325,000

Before the War the number of banks with capital of less than Y.500,000 was 1,755 ; at the end of 1920 this number had fallen to 1,046,a decrease of 709. Banks with capital between Y.500,000 and Y.1,000,000 before the war were few in number, in 1913 there were 235, by the end of 1920 there were 497. There were only 165 banks with capital of more than a million before the war, but by the end of 1920 there were 496 banks whose capital was more than Y.1,000,000 and less than Y.10,000,000.

A capital of Y.10,000,000 in any industry in Japan was about the limit of investment before the war. There were only 14 banks, including the Bank of Japan, with that amount of capital in 1913. Excluding the Bank of Japan and the Yokohama Specie Bank the greatest bank in this class before the war was the Fifteenth Bank (Jugo Ginko), with a capital of Y.40,000,000, and the Dai Ichi (First) Ginko, and the Mitsui Ginko had capital of only Y.20,000,000 each. At the end of 1921 there were 43 banks with capital of more than ten millions, while the limit of investment had been pushed up above a hundred millions. Besides the Yokohama Specie Banks, the Mitsui Ginko and the Fifteenth Bank belonged to this super-group.

The greatest part of the loan funds of these banks is in their deposits, but besides the deposits, the capital and reserves are used in the money market. Before the war the paid-up capital of all banks was Y.616,000,000. At the end of 1921 it had increased to Y.1,712,000,000. Bank reserves in 1913 amounted to Y.218,000,000, at the end of 1921 they had increased to Y.591,000,000, an increase of more than 150 per cent.

Year	Paid-up Capital	Reserve	Total	Index.
1913....	Y.616,000,000	Y.218,000,000	Y.834,000,000	100
1914....	645,000,000	237,000,000	882,000,000	106
1915....	651,000,000	255,000,000	906,000,000	106
1916....	678,000,000	274,000,000	951,000,000	119
1917....	776,000,000	297,000,000	1,072,000,000	124
1918....	899,000,000	333,000,000	1,232,000,000	148
1919....	1,209,000,000	366,000,000	1,575,000,000	188
1920....	1,678,000,000	536,000,000	2,157,000,000	258
1921....	1,712,000,000	591,000,000	2,304,000,000	279

Bank deposits in all the banks in Japan before the war, 1913 were only Y.2,211,000,000. They increased to more than Y.5,704,000,000 in 1917, and at the end of June, 1921 they had risen to Y.10,353,000,000. The deposits, paid-up capital and reserves of all banks in Japan amounted to Y.12,657,000,000 at the end of June, 1921. Before the war, 1913, they were only Y.3,045,000,000 ; the increase was accordingly 310 per cent.

Year	Deposits (Y.1,000,000)	Capital	Total (Y.1,000,000)	Index.
1913	Y.2,211	Y.834	Y.3,045	100
1914	2,313	882	3,195	105
1915	2,797	906	3,703	121
1916	3,816	951	3,767	124
1917	5,704	1,072	6,776	222
1918	8,136	1,232	9,368	308
1919	9,777	1,575	11,352	373
1920	9,842	2,157	11,999	406
1921 (June) ..	10,353	2,304	12,657	410

As the amount of money in circulation increased it naturally found its way into the central money markets, Tokyo, Osaka and Naogya,the three industrial centres of the empire. At the end of June,1922, the exchange banks in these three cities held deposits of Y. 3,627,000,000 and their paid-up capital was Y.695,000,000 and their reserves were Y.286,000,000, a total of Y.4,590,000,000. Before the war this total was only Y.875,000,000, so that by the end of June, 1922, the increase was 420 per cent.

The capital of the exchange banks in the three great industrial centres, Osaka, Tokyo, Nagoya, before the war was 11.7 per cent. of that of all the banks in Japan. At the end of June, 1922, it had increased to 40.4 per cent. of the total.

THE EXCHANGE BANKS IN THE THREE INDUSTRIAL CENTRES, 66

Year	Paid-up Capital (Y1,000,000)	Reserve	Deposits (Y1,000,000)	Total	In 'ex	Per centage of whole country
1913	Y.161	Y.62	Y.52	Y.975	100	28.7
1914....	208	75	741	1,025	117	32.1
19c5....	202	82	945	1,229	140	33.2
1916....	224	89	1,463	1,777	203	47.1
1917....	264	97	2,328	2,690	307	39.7
1918....	330	117	3,334	3,782	432	40.4
1919....	469	112	3,774	4,355	498	38.3
1920....	624	188	3,599	4,410	504	37.0
1921....	676	242	3,779	4,696	537	40.4
1922....	695	268	3,627	4,590	524	——

The liquid assets of the banks in these three cities at the end of June, 1921, amounted to Y.5,129,000,000, an increase of just 570 per cent. since before the war. They comprised 29.3 per cent. of the assets of all the banks in the country before the war, and 40.5 per cent. after it.

Twenty-two banks before the war had a capital of Y.571,000,000. These banks were the Yokohama Specie Bank, Taiwan Bank, Chosen Bank, Industrial Bank of Japan, Dai Ichi Ginko, Jugo (Fifteenth) Ginko, Dai San (Third) Ginko, Mitsubishi Bank, Yasuda Bank, Kawasaki Bank, Dai Hyaku (Hundredth) Ginko, Mitsui Bank ; These banks in Tokyo. In Osaka there were the Sumitomo Bank, Yamaguchi Bank, Sanjushi (34th) Ginko, Kajima Bank, Konoike Bank, Omi Bank, Kyaku Sanju (130th) Ginko, and in Nagoya the Aichi Bank, Meiji Bank, and the Nagoya Bank. After the war the capital of these 22 banks had increased to Y.3,360,000,000. Before the war their capital was 65.3 per cent. of all the capital of all the banks in the three great industrial centres, after the war it had increased to 71.6 per cent. Compared to all the banks in Japan before the war their combined capital was 18.7 per cent. at the end of June, 1921, it had reached 26.6 per cent. of the whole.

Electric Plants in Fukien

ELECTRIC light plants in the province of Fukien are on the increase. The Kwan Kiang Electric Light Co. has again increased its capital, and is making plans to supply Lienkiang district electricity by leading wires to it, for which poles are now being erected. The Tungan Electric Light Co. proposed by Wu Shih-hwang, Kienyang Electric Light Co. proposed by Chen Hsiao-sin and Yungtaihsien Sungkowchen Electric Light Co. proposed by Ling Kien-tsing have all purchased necessary machinery from abroad, and are in the course of applying for registration from the government. When once the registration and licenses of trade are granted, work will immediately commence. The Shihma Hwa Tai Electric Light Co. has resumed its operation after a period of suspension through an accident of fire.

The Nanzin Electric Light Co., Ltd. at Nanzinchen, Chekiang, has been licensed by the ministry of communications to supply electricity to the consumers at Chentseh, Kiangsu, a district being about 12 *li* from Nanzinchen.

INDO-CHINA

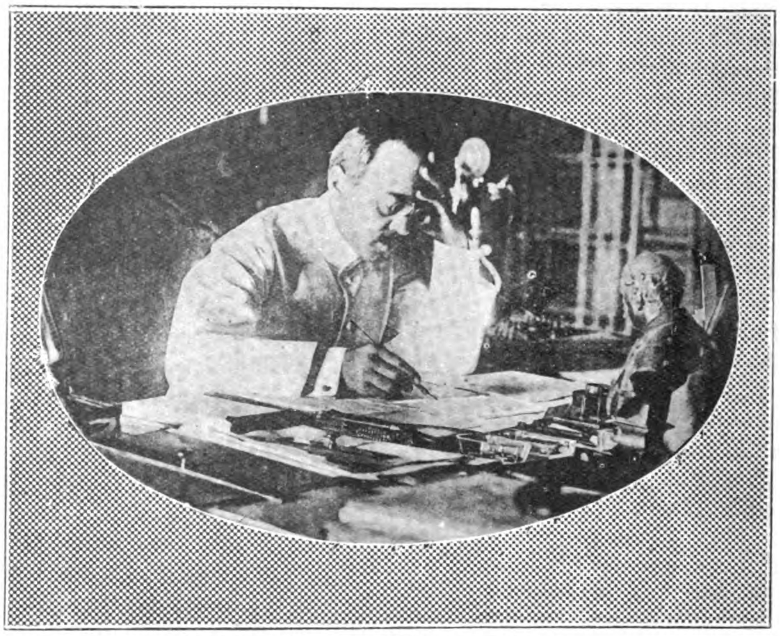
Present Conditions and Future Development

By Georges Hebmann (Chevalier of the Legion of Honor), Manager, Paris Office Guaranty Trust Company of New York, in "The Asiatic Review"

AT a time when the attention of all the civilized nations of the world is called with particular insistence to the possibilities of developing their own resources and those of their colonies, it should be interesting to cast a glance on a country which, as a result of its geographical situation, the aptitude of its population, and its marvellous natural riches, is called upon to play a part of growing importance in the economic life of the Far East. This country is Indo-China. one of the finest parts of France's colonial estate, and which, within the short lapse of time during which it has been under French rule, has given such satisfactory results, that it could be said to have justified all the hopes which have been placed in it.

ORGANIZATION

HISTORY.—At the end of the eighteenth century, France had already obtained a footing on different points of the coast of Indo-China, but the creation of this colonial domain, the history of which would be too long to relate, actually dates back to the year 1862, when France occupied the three provinces of Saïgon, Bien-Hoa and Mytho in Cochinchina, which was definitely acquired in 1867, when the three remaining provinces were taken over. In 1863 a protectorate was established over Cambodia, and in 1873 France occupied Hanoï in Tonkin. There is no need to retrace the well-known events which brought about the signing of the Tien-Tsin Treaty of June, 1885, under which China acknowledged the protectorate of France over Annam and Tonkin. Gradually the pirate bands which disturbed the peace of the country were dispersed, and in 1889 the work of pacification was practically completed. Since that time, except for a few unimportant incidents, the country which nowadays forms the "Union Indo-Chinoise" has enjoyed peace under the liberal rule of France, whose authorities, respectful of the religions and customs of the native population, have striven to gain a whole-hearted co-operation on the part of the latter. That this result may be considered as having been achieved is evidenced by the fact that during the war Indo-China furnished an important contingent of soldiers and artizans who took part in the world's struggle. Moreover, the revolutionary tendencies which became so violently manifest in other European colonies have found little favor amongst the high classes of Annam and Tonkin.



M. Albert Sarrault, Minister of Colonies

M. Maurice Long, Governor-General of Indo-China

POLITICAL ORGANIZATION.—Nowadays the various countries of Indo-China are, from an administrative point of view, grouped together under the name of "Union-Indo-Chinoise." It includes the colonies of "Cochin-china" and of "Laos" and the protectorates of "Cambodia," "Annam," and "Tonkin," to which should be added the territory of Kouang-Tcheou-Wan, leased to France by China for a period of 99 years from 1898.

The Union Indo-Chinoise is administered by a governor-general, assisted by a general secretary and a high council of government. The governor-general is the representative of the French republic, and is invested with numerous and far-reaching attributions. One of his duties is to prepare the budget bill, which, however, must be sanctioned by decree of the French president.

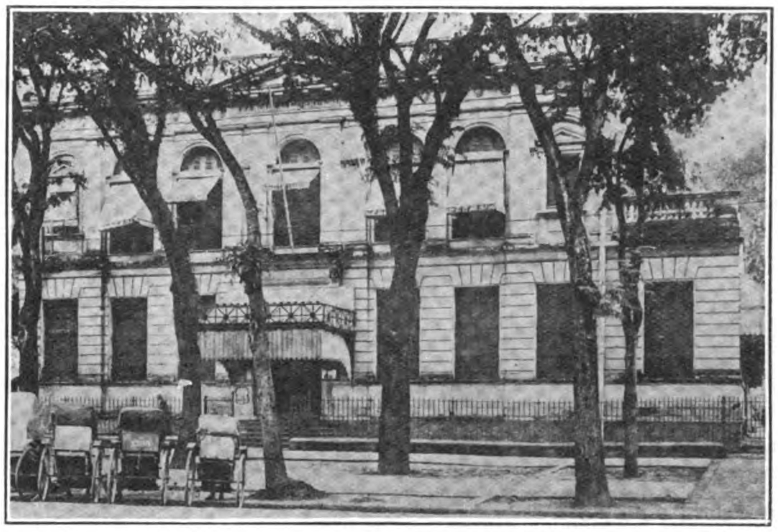
The governor-general delegates part of his powers to lieutenant-governors and residents for the administration of the colonies and protectorates respectively.

A feature of the policy of France has been the maintenance, so far as possible, of the local administration as a foundation on which to establish her rule. In protectorates the rights of the sovereigns and of the functionaries appointed by them are always respected. Furthermore, to ensure a smooth working of the French and native organizations, native assemblies have been created to be consulted on the affairs of the country.

GEOGRAPHY.—Indo-China covres an area of over 775,000 square kilometres—that is, one and a half times France's area, with an S-shaped coast of over 2,500 kilometres. This peninsula is divided lengthwise by a chain of mountains running from north to south, and separating the basins of the rivers Mékong in Cochinchina and Annam and Song-Coi (Fleuverouge) in Tonkin.

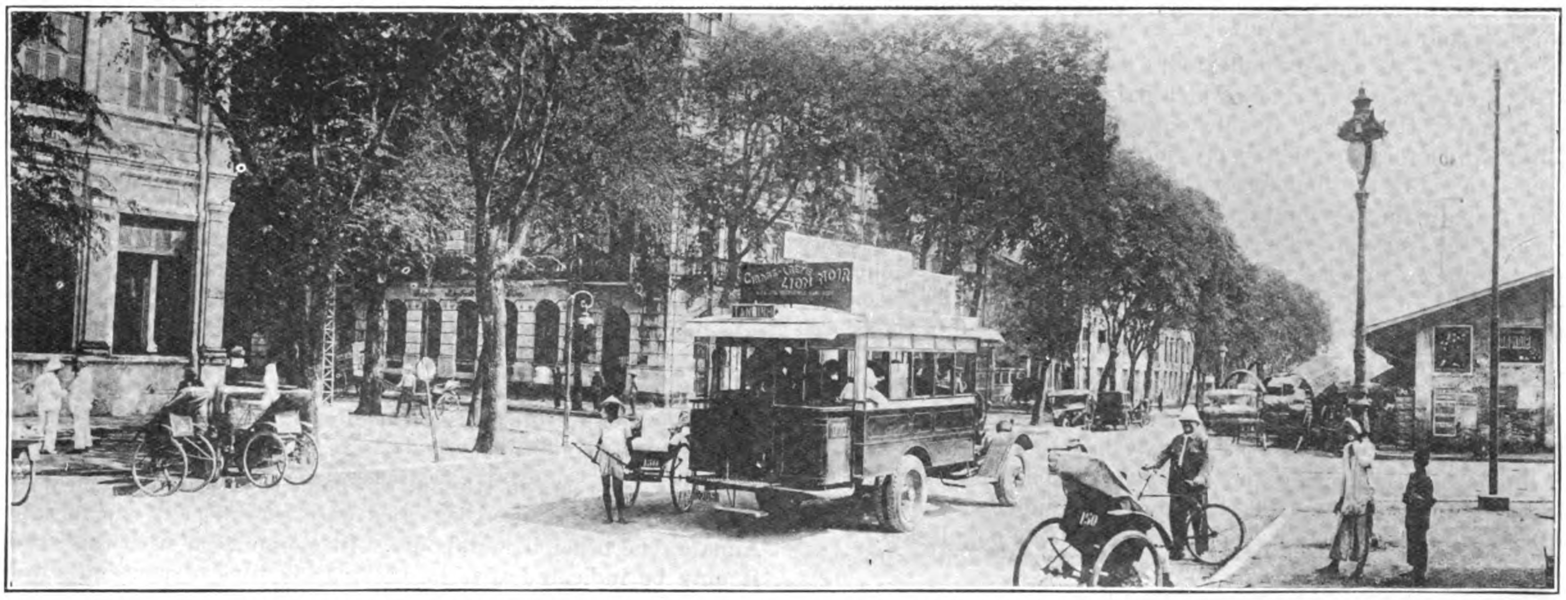
These rivers, which at high water are navigable for a large part of their course, serve as a means of access from the sea to the interior of the country and the rich provinces of Yunnan and Kouang-si in China, which now can also be reached by the Yunnanfou railway from Hanoï.

ROADS.—The network of roads in Indo-China is already considerable, and there is in particular a good road which, save for a small portion of about 80 kilometres in central Annam, runs from Lang-Son, on the Chinese frontier in Tonkin, to Battambang in Cambodia, near Siam, so that in a few years, when bridges or ferry-boats are established on the Mékong and Bassac branch, it will be possible to drive in an automobile from China to Siam along the whole coast of the peninsula.



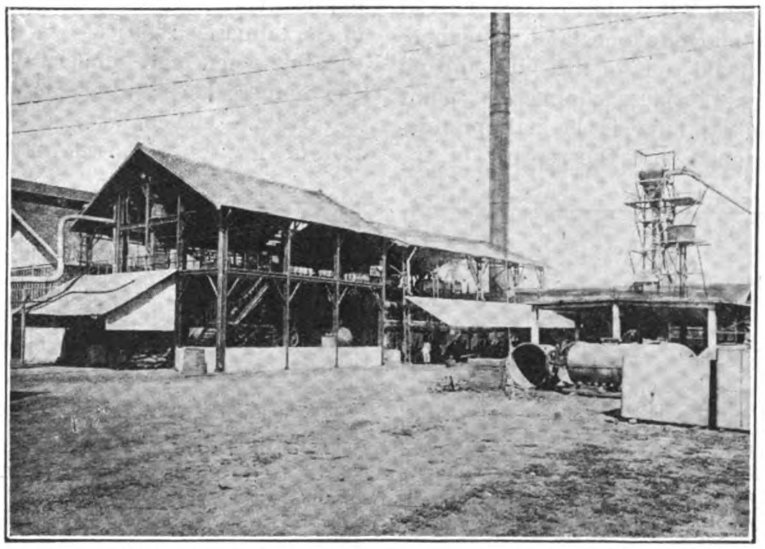
Saigon Branch of the Banque de l'Indo-Chine, the principal financial institution of the Colony

RAILROADS.—As regards railroads, the lines in operation extend over 534 kilometres in Cochinchina and south Annam, 174 in Central Annam. In Tonkin the network is more important. The lines which radiate from Hanoï (pop. 107,000) are the Hanoï-Na-Cham line to the Chinese frontier (167 kilometres), the Hanoï-Vinh-Benthuy line (326 kilometres), running along the coast in a southerly direction, and finally the Haïphong-Hanoï-Laokay line (383 kilometres), built by the colony, but operated by the Compagnie Française des Chemins de Fer de l'Indo-Chine et du Yun-Nan, which built also the extension Laokay-Yunnanfu, penetrating into Chinese territory. This last line, in the construction of which the engineers had to overcome the greatest natural obstacles, is now extremely prosperous, owing to the importance of the traffic of the rich provinces of China.



Saigon : Quai de Belgique corner of rue d'Adran, showing type of Autobus for public service

PORTS.—There are numerous small ports, but there are only two so far of real importance : They are Saïgon (pop. 83,135), in Cochinchina, which, at the mouth of the Mékong, and with its important fluvial port of Cholon (pop. 226,537), is a most convenient outlet for the products of the rice provinces of south Cochinchina, Cambodia, and south Annam; the other is Haï-Phong (pop. 74,917), in Tonkin, which is on the direct route from southern China to the sea. In 1919 over 4,000 ships, representing a tonnage of 2,300,000 metric tons, entered Saïgon harbor, whereas the figures for Haï-Phong were about 3,400 ships, with 667,600 metric tons, in 1918. Tourane is the port of central Annam, and later on may assume greater importance when better means of communication to distant Laos are established over the mountainous regions of Annam.



One of the plants of the Societe Francaise des Destilleries de l'Indo-Chine, the largest distillers of the French Colony

POPULATION.—Indo-China is, as a whole, sufficiently populated, so that its economic development is not likely to be hampered by the lack of labor, as is the case in many new countries. The whole population exceeds 17 million inhabitants, corresponding to an average of 20 per square kilometre. This appears comparatively small; but it should be borne in mind that an enormous area of the country is thickly wooded and mountainous, so that, while the

Saigon Arsenal, equipped with complete Shipbuilding and Repairing Plant. The s.s. "Albert Sarraut" on the ways ready for launching

proportion is only 2 inhabitants per square kilometre in the Laos district, 10 in Cambodia, 27 in Annam, it rises to 53 in Cochinchina, and 59 in Tonkin ; in the delta of the Song-Coi it even exceeds 333.

The white population, which is mostly French, numbers about 20,000, not including the troops, which before the war were about ten thousand strong.

RIVERS.—As already indicated, a salient feature of Indo-China is the great number of rivers which irrigate practically all parts of the country ; the largest, the Mékong and the Song-Coi, end in wide deltas, which form the richest provinces of Indo-China. In Cochinchina especially the digging of the canals, which was begun on a large scale by the first military chiefs, and which has been continued since by the successive governors, is one of the finest achievements which France can boast of having accomplished in her colonies ; a consequence of the continuation of this wise police has been the development of the rice production, which has trebled in the course of twenty years.

The conditions of living of the population have been, of course, determined by the geographical characteristics of the country, and this accounts for the fact that Indo-China is primarily a country of intensive rice growing and of marine and fluvial fishing. The local consumption of fresh fish is enormous, and comes immediately after that of rice, which is the staple food of the population.

NATURAL RESOURCES.

FISHING INDUSTRY.—In favorable years Indo-China exports over 30,000 metric tons of dried fish and 2,000 metric tons of fresh fish to neighboring countries, and to Hongkong and Singapore especially. As by-products, about 3,000 tons of fish glue and oil are shipped from the colony yearly. From a commercial point of view, Camboda, with the big Tonle-Sap Lake, is the main productive centre, and it should be mentioned that the renting of the fishing licence is an appreciable source of revenue for the Government.

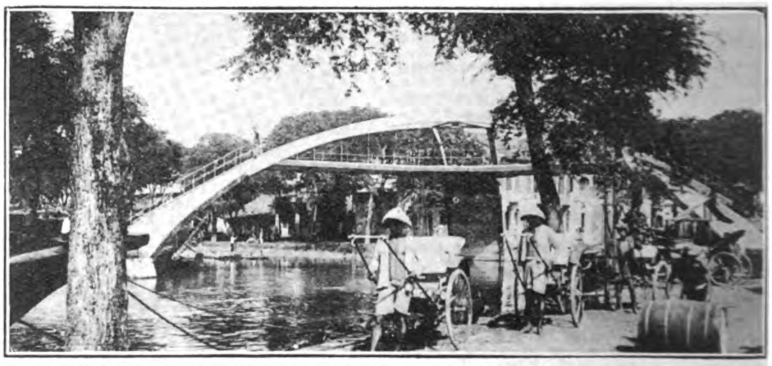
The fishing industry could beyond and doubt be further developed if the obsolete methods still used by the natives could be gradually replaced by trawling. Though competition may come from Japan, and perhaps from the Philippine islands, so great is the demand from China that this country is likely to remain always a good market for the Indo-Chinese production ; at the same time the fish oil industry could be also intensified, and larger exports would be easily absorbed in France or other European countries.

CATTLE.—Before turning to the capital question of rice production, we may say a few words of cattle raising. The most recent census reported in Indo-China 3,000,000 head of cattle (including 1,500,000 buffaloes) and 2,660,000 pigs ; out of this total there are 1,200,000 oxen and buffaloes in Cambodia alone, which, in 1910, was able to export 31,594 oxen and 15,975 buffaloes to the Philippine islands (33,000 oxen and buffaloes in 1911). However, the prospects of a great development for cattle raising are as a rule impaired by violent epizootics, difficulty of feeding during the dry season, and other climatic conditions.

In recent years an attempt was made to create frozen meat and packing industries ; two factories were established, one in south Annam, the other in Cambodia. In conjunction with this trade, it may be indicated that in 1913, 3,139 tons of raw hides were exported from the colony, one-half of which went to France, the other half being shipped to China and Hongkong. Exports of manufactured skins are small (783 tons) owing to the imperfection of the tanneries ; but there is the possibility of a great expansion in this line when more modern installations attract the production of the Siamese Laos and of Yunnan.

RICE.—The chief source of riches for Indo-China is the cultivation of rice, for which the natural lay of the country and climatic

Chinese Rice Mill at Cholon



Arched Reinforced Concrete Bridge at Cholon (Saigon) erected by Brossard et Mopin

conditions are most suitable. The rice fields now under cultivation cover about 4 million hectares (over 1,500,000 in Cochinchina, 900,000 in Tonkin, and 700,000 in Cambodia). In 1920 the area sown with rice was 4,800,000 hectares, but there is still the possibility of recuperating about 1,800,000 hectares. The qualities of the rices grown, when carefully selected and hulled, compare most favorably with the best Burma and Java descriptions, but owing to the fact that until recent years the whole rice manufacturing was in Chinese hands and the methods generally defective, the Indo-Chinese varieties were generally considered as inferior ; efforts are made now to have selected seeds giving a better yield both in quantity and quality. Three or four years ago two important rice factories, operating with up-to-date equipment, were established in Cochinchina and Tonkin. The native consumption takes up about 3½ million metric tons of rice yearly ; up to 1913 the production averaged about 4½ million tons, so that one million tons was available for exports. As production has developed, the exports have gone up from 250,000 metric tons in 1868 (1,286,804 tons in 1913) to 1,619,715 tons in 1918 ; for 1919 the exports amounted to 966,835 tons only. This big decline was due to the rise of the Indo-Chinese piaster, which exceeded that of the Indian rupee, so that rice importers were induced to make their purchases in Burma. These figures show Indo-China to rank immediately after Burma for rice exports ; most of these go to China, Japan, and the Philippine islands through Hongkong. Though competition may become keener, the situation of Indo-China in the middle of a population of over 500 million of rice-eaters is a guarantee of a sure outlet for her surplus. Besides, in the last twenty years export to Europe has been steadily increasing, and France under normal conditions is likely to become an important customer for her colony.

Other Cereals.—Another cereal prospers in Indo-China ; this is maize, which until recent years was hardly known outside Tonkin ; now its cultivation spreads over all the regions of the Union Indo-Chinoise, and it seems to be well adapted for Cambodia especially. Exports, which amounted to only 107 tons in 1904, reached a maximum in 1913 with 133,000 tons, and have averaged 54,000 tons since.

Other produce are manoic, arrowroot, sweet potatoes, beans and peas, the production of all of which might easily be developed in Cochinchina and Tonkin, to leave a surplus available for exportation to Europe ; thiere are also numerous fruits—mangoes, mangosteens, ananas, and letchis—but they are mostly consumed in the country, and some years would elapse before export could really become important. A first condition would be to have steamers adapted for the carriage of tropical fruits.

Coffee.—Coffee can also be cultivated with success. Advantages have been granted to planters in the way of a premium paid on exports to counterbalance the abnormal value of the local currency. The exports barely attained 234 metric tons in 1909 ; they were more than doubled in 1919 (534 metric tons).

Tea.—Indo-Chinese tea, though inferior in quality to China tea, is generally admitted to be quite as good as the Ceylon brands, and with some efforts to improve the cultivation and preparation methods, it could be made to compete successfully with English and Chinese teas on the French market, which could easily take all the production. Algeria, Tunisia, and Morocco, with an annual consumption of 3,000 metric tons, would become also excellent customers.

Sugar.—Sugar-cane growing succeeds in all regions, but great improvements are needed to obtain anything like the 10 tons yield per hectare obtained in Java, the present yield being scarcely 2 to 2½ tons ; however, in view of the enormous Chinese market at the very door of the French colony, it seems that it would be well worth trying to increase the production, which averages only 3,000 tons yearly.

Pepper.—Indo-China is a large producer of pepper (4,000 tons yearly during the war); in a certain year the exportation exceeded 6,300 tons, one half of which went to France, and satisfied the whole metropolitan consumption. Nutmeg is also an important product, though the Indo-Chinese variety meets with comparatively little appreciation in European markets (837 metric tons in 1919).

Cotton.—Among the textile plants which grow in the colony, particular attention should be given to cotton. The production is about 9,000 metric tons yearly, 6,000 tons coming from Cambodia, and the rest from south Annam. There are two kinds of cotton : one, cultivated along the banks of the Mékong, which are flooded each year, gives a short staple (18 to 22 millimetres) product, which is utilized on special looms ; the other kind, grown on the high ground called " terres rouges," of incomparable fertility, is a most excellent product, with a long staple (28 to 29 millimetres), comparing favorably with the American " good middling." Since the war a large portion of land has been cleared for cultivation, and up-to-date ginning mills have been installed with American machinery at Kompong-Cham in Cambodia ; they can produce 80 bales of 110 kilos per 12-hour day. There is another important ginning factory at Khsah-Kandal, dating back to 1891, which is in Chinese hands ; it treats about 6,000 metric tons of raw cotton yearly, producing 300 tons of oil and 1,600 tons of oil-cakes. The total area available for cotton-growing in Cambodia may be estimated at about two million hectares ; but one of the difficulties to be overcome is the lack of labor, for which the only remedy would seem to be immigration of Chinese artisans.

Silk.—Silk is another item of particular present interest in view of the keen competition of American and Japanese purchasers on the Chinese market, which render the supplying of European manufacturers daily more difficult. The silk industry was, needless to say, a fundamental one in Indo-China ; but the methods applied by the native silk producers gave comparatively poor results. Owing to constant efforts, a material improvement has been achieved not only in quantity (1 kilo of raw silk for 18 kilos of cocoons against 26 kilos formerly), but also in the quality, which can now be assimilated to the Canton first grade ; Tonkin pongees are also appreciated. Up to now, the major part of the production was utilized locally, the maximum quantity exported being 101 tons in 1911 ; but it is considered in colonial circles that the production, through private as well as official enterprise, could be tremendously increased, for the conditions are extremely favorable. There can be no fewer than five silkworm crops yearly. At present the area cultivated in Chinese mulberries is 8,000 hectares, with an output of nearly 4,000,000 kilos of fresh cocoons and 150,000 kilos in raw silk for Cochinchina and Cambodia alone ; a methodical program is now contemplated through the medium of a company founded by Lyonese producers to bring the production to 900,000 kilos of raw silk within ten years.

Textile Plants.—Other textile plants in Indo-China are jute, ramie, hemp, and kapok ; plantations of the tree from which this raw fibre is obtained could be developed to some advantage in Cambodia especially. As much may be said of the coconut tree, the present production of coir used for the manufacturing of cordage being entirely absorbed in the country.

Rushes, which are extremely abundant in the seaboard districts of Tonkin and Cochinchina and other marshy districts of the peninsula, are utilized locally for the manufacture of mats ; these articles are exported to Hongkong, from where an important portion is re-exported to Europe under a Chinese label. In the thickly-populated delta of Tonkin there is a local small industry which uses a number of other plants—rotins, latania, rice straw, etc.—for the manufacture of mats, baskets, furniture, etc.

Bamboo.—A most interesting use of the bamboo-tree is the manufacture of paper pulp. A factory was established in 1912 at Vietry, and its yearly output amounts to about 3,000 metric tons of excellent wood pulp, part of which is utilized in a paper factory at Dap-Cau. This is only a beginning, and there are large possibilities for expansion, as the bamboo-trees are found in enormous quantities along the banks of the Tokinese and Cochinchinese rivers and many other regions of the country.

Until now, the soda and chloride of lime necessary for paper manufacturing have been imported from Japan ; but a chemical

factory has recently been erected at Haï-Phong for the treatment of salt by electrolysis, and will be able to supply the chemicals necessary at a much lower price.

Other plants providing good material for the paper industry are rice and " tranh," an indigenous herb growing rapidly in all parts of the colony.

Experiments are being made also with the idea of utilizing the pine trees which cover large areas in the wooded regions of the interior.

ESSENTIAL OILS.—Among vegetable resources should be mentioned such oleaginous plants as coconut-trees, sesame, ground nuts, ricinus, and soja. In 1914 the exports of copra reached 8,100 metric tons ; those of castor-oil were 899 metric tons ; soja cakes are excellent as cattle food, and find a good market in England.

Numerous plants are available for the manufacture of essential oils and perfumes, such as citronella, lemon grass, ylang-ylang, cajeput, camphrea, cutch, coca, indigo, etc. These resources have already been exploited, but not nearly to the extent which the possibilities warrant ; however, it should be mentioned that badian, the essential oil derived from the fruit of the Chinese anise-tree, shows up well among the exports from Tonkin ; these exports averaged 98,000 kilos annually for the period 1909-1913, with a maximum of 249,000 kilos in 1913 ; the chief market was Hamburg.

TOBACCO.—Tobacco has been grown in Indo-China for a long time for local consumption ; the native varieties are, however, unsuitable for European taste, and attempts have been made with good results to obtain better qualities. In 1920 certain quantities were imported into France for the government.

RUBBER.—Last, but not least, in view of the possibilities of development which it offers, should be mentioned the cultivation of indiarubber trees. Some twenty years ago, Indo-China exported a small quantity of indiarubber produced by the trees growing in the forests of the interior ; but the acclimatization of the Hevea has been attempted since with great success, and now practically all the products exported come from Hevea plantations. The development of this industry is shown by the progression of exports which from 175 metric tons of indiarubber (wild and cultivated) in 1910 went up to 531 in 1918, and 2,976 in 1919 of cultivated Hevea alone. The abrupt drop in the price of the " hard Para " and " Plantation Crepe " on the London market put a temporary check on the production, but it is expected that the Indo-Chinese output may be brought up to about 8,000 tons yearly some years hence, when circumstances warrant.

MINES AND INDUSTRIES

COAL.—From the point of view of mineral resources, the fact of capital importance is the presence of coal in Tonkin. There are deposits in central Annam and Laos ; but, for the time being, the Tonkin coal mines alone retain our interest. The most important are those of Hongai (operated by the Société Française des Charbonnages du Tonkin), covering 22,000 hectares in the Bay of Along, at 25 kilometres from Haïphong, with three centres of exploitation at Hongai, Hatou, and Campha. The reserves are estimated to be 12 billion tons ; but there remains a long stretch of territory to be prospected. The Hongai coal is anthracitous and, as such, ill-suited for shipping requirements. Imports of soft coal from Japan are necessary ; but it is hoped that they will be reduced in the future, as soft coal mines have recently been discovered in Tonkin. Other coal-mining concerns are the " Charbonnages de Kebao," the " Charbonnages de Dong-Trieu," and the " Anthracites du Tonkin," but the Hongai mines are by far the largest producers. Their output increased from 257,000 metric tons in 1908 to 576,000 tons in 1916 (544,000 metric tons in 1917). It could be easily brought up to 900,000 metric tons and later on to 1,200,000 tons, if the demand justified this development. The output of the other mines is only 150,000 tons. In 1917 the total output of the colony was 653,910 tons, out of which 313,680 tons were exported, the chief customers being Hongkong, the Philippine islands, and even Japan.

The importance of coal for the prosperity of the colony is emphasized by the presence of important metal mines in the vicinity of the coal, thus opening fair prospects for the creation of a metallurgical industry. Iron is found in four principal districts : (1) That of the Red River (magnetite and hematite) ; (2) that of the Song-Cau (hematite) ; (3) that of the Song-Bang-Giang (magnetite) ; (4) the Dong-Trieu mines near Hongai. Some other mines have also been located in Laos, Cambodia, and Annam, but owing to the climatic conditions, lack of labour, and of coal, they are less interesting for immediate operation.

Whilst iron represents future prospects, zinc is already a paying industry. There are rich mines of blende and calamine in the province of Bac Kan in Tonkin : their holding in pure metal exceeds 60 per cent.; the annual output varies between 30,000 and 40,000 tons yearly, most of which is exported to Europe (production, 48,825 tons in 1916, and 42,552 tons in 1917 ; exports, 38,190 tons and 19,950 tons in the same years respectively).

Other mineral products are tin and tungsten (at Pia Ouac, production 600 tons in 1918), antimony and gold (Bong Mieu—120 kilos gold) ; manganese ore (pyrolusite) is abundant in Tonkin. Graphite is found also at Quang-Ngai, whence 7,200 tons were exported in 1919.

INDUSTRIES.—This survey of the natural resources of Indo-China shows the wide possibilities of expansion which are opening up for industry there. At present, rice factories and distrilleries take the first place. The former are found practically everywhere ; they are generally small and operated by obsolete methods. The most important (ten in number in 1913) are those equipped with modern machinery ; they are owned by Chinese interests, and are established in the vicinity of Cholon, near Saïgon. In recent years two French companies have been created, the " Société des Rizeries d'Extreme Orient " (capital 25,000,000 frs.) and the " Rizeries Indo-Chinoises." The rice alcohol which is consumed by the native population is manufactured for its greater part by the " Société Française des Distilleries de l'Indo-Chine "; the manufacture is under the control of the government. There are besides a few small distilleries, the number of which is legally limited. Numerous mining concerns are already established in Indo-China, but the metallurgical industry is still in its infancy. It should be mentioned, however, that owing to the fact that the engineering industry is already well represented by the Saïgon arsenal, the repair workshops of the Messageries Fluviales, the workshops of the colony railroads and other private concerns, there exists already an important nucleus of skilled workmen.

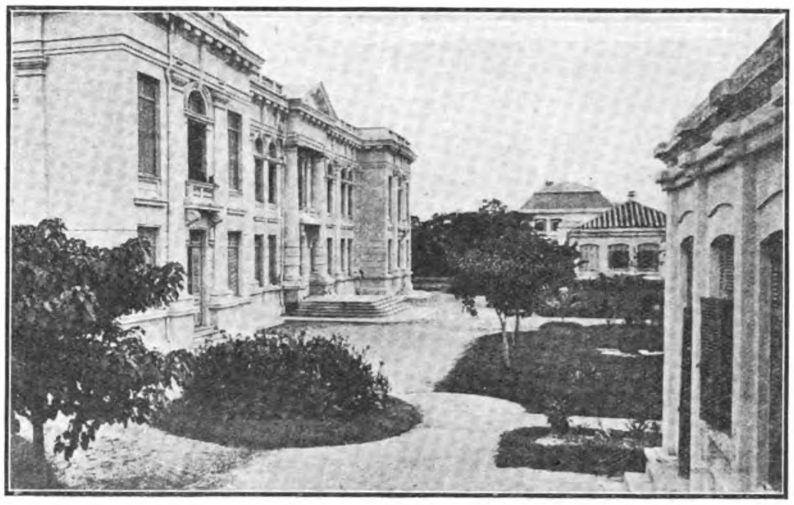
The timber industry counts a considerable number of native works. There are also a few saw mills, wood distilleries, and two match factories.

According to official figures, the number of industrial, commercial, and agricultural companies is 74, representing a capital invested of about 256 million francs ; there are, besides, 22 important private firms.

This brief review shows that much remains to be done before anything like a rational exploitation of Indo-Chinese resources is really begun ; but the fact stands out that the following products, among many others, offer great business possibilities : rice, cotton, silk, bamboo, fisheries, coal, and metallurgy. The country is sufficiently populated to supply the labor which, as a rule, is found pliable and adaptable to most kinds of occupation. In any case, China is near at hand, and could supply any amount of excellent labor.

The remarkable possibilities which are thus opening in Indo-China have not escaped the attention of the French colonial authorities. But whereas, prior to the war, there was less necessity to push on the development of the colony, the new circumstances born of the war are making it imperative that France shall devote more attention to her Far Eastern possession, which could procure her a a large portion of the raw materials (rice, cotton, silk) for which she is now dependent upon foreign markets.

Rue Paul Bert, Hanoi



Residency at Hue, Annam

Expansion—Finances, Commerce

A wide program has been recently established by the French colonial minister to equip the colony more fully for its part in the world's commercial future. This program involves the construction of 2,322 kilometres of railroad lines, and in the first place the completion of the Trans-Indo-Chinese railroad (Vinh-Dongha section 300 kilometres, and Tourane Saïgon section 530 kilometres), then the Cambodia railroad from Saïgon to Batambang, and the connecting of the Tonkin lines with the Chinese railroads ; the improvement of the ports of Saïgon, Haïphong, Tourane, and Kouang-Tcheou-Wan ; the extension and improvement of the networks of canals in Cochinchina ; draining and irrigation works in Tonkin and Cambodia (in the latter region 7,000,000 hectares of land are barren ; 3,000,000 hectares are of exceedingly rich soil suitable for rice or cotton growing) ; the building of dams for protection against the Song-Coi floods in Tonkin ; the extension and improvement of the roads, etc.

The funds for this program will have to be provided by means of loans. But the prosperity of the colony is such that the increment of charges to be incurred on that account is likely to be easily borne. It suffices to indicate in this respect that, according to official figures, the total funded debt of Indo-China in 1920 amounted to 388,643,798 frs., involving the payment of annuities of 18,558,760 frs. As the aggregate expenses of the budget represented 98,830,741 dollars, the annuities necessary for the service of the loans corresponded to only 6.26 per cent. of the total expenses, computing the piastre at the rate of 3 frs.; but as the currency stands at a premium, the present loan charges are considerably below this percentage.

This appreciation of the local currency is not without its drawbacks, as, from the point of view of French expansion, it prevents the inflow of French capital which is so necessary to regenerate the dormant forces of this huge country.

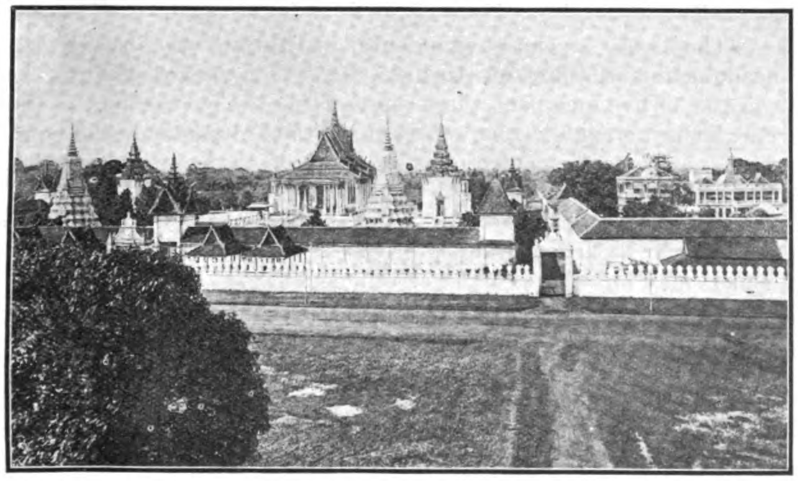
The question of the currency has been of paramount importance since the war. In 1914 the value of the piastre, which contains 24.03 grams of fine silver, was about 2.50 frs.; but the appreciation of the value of the silver metal and the decline of the franc were two factors which in conjunction with a favorable trade balance caused a tremendous rise of the piastre ; the latter attained 16.50 frs. (maximum) in February, 1920 ; subsequently there were violent fluctuations, which in consequence of the difficulties they caused in the economic life of the country necessitated an action on the part of the government ; the latter, rejecting all radical solutions, such as the creation of a gold standard, a reduction of the fine silver contained in the coins or the introduction of the franc as monetary unit, determined that the piastre notes of the Banque de l'Indo-Chine should compulsorily be accepted as legal tender (cours forcé), and that the exchange rate with the franc would be fixed from time to time by decree.

A few statistical data will serve to show the development of the foreign trade of the " Union Indo-Chinoise " in recent years :

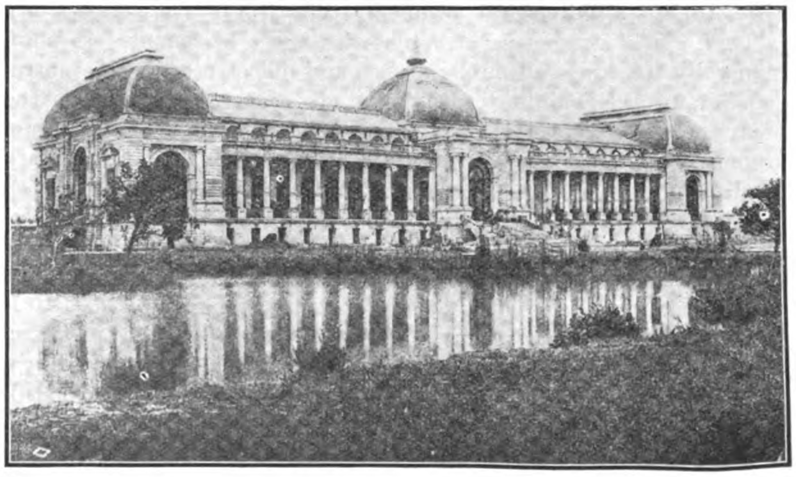
(In million francs.)

Years.	Imports.	Exports.	Total.
1913	305	345	650
1919	751	1,051	1,802
1920	1,097	1,181	2,278

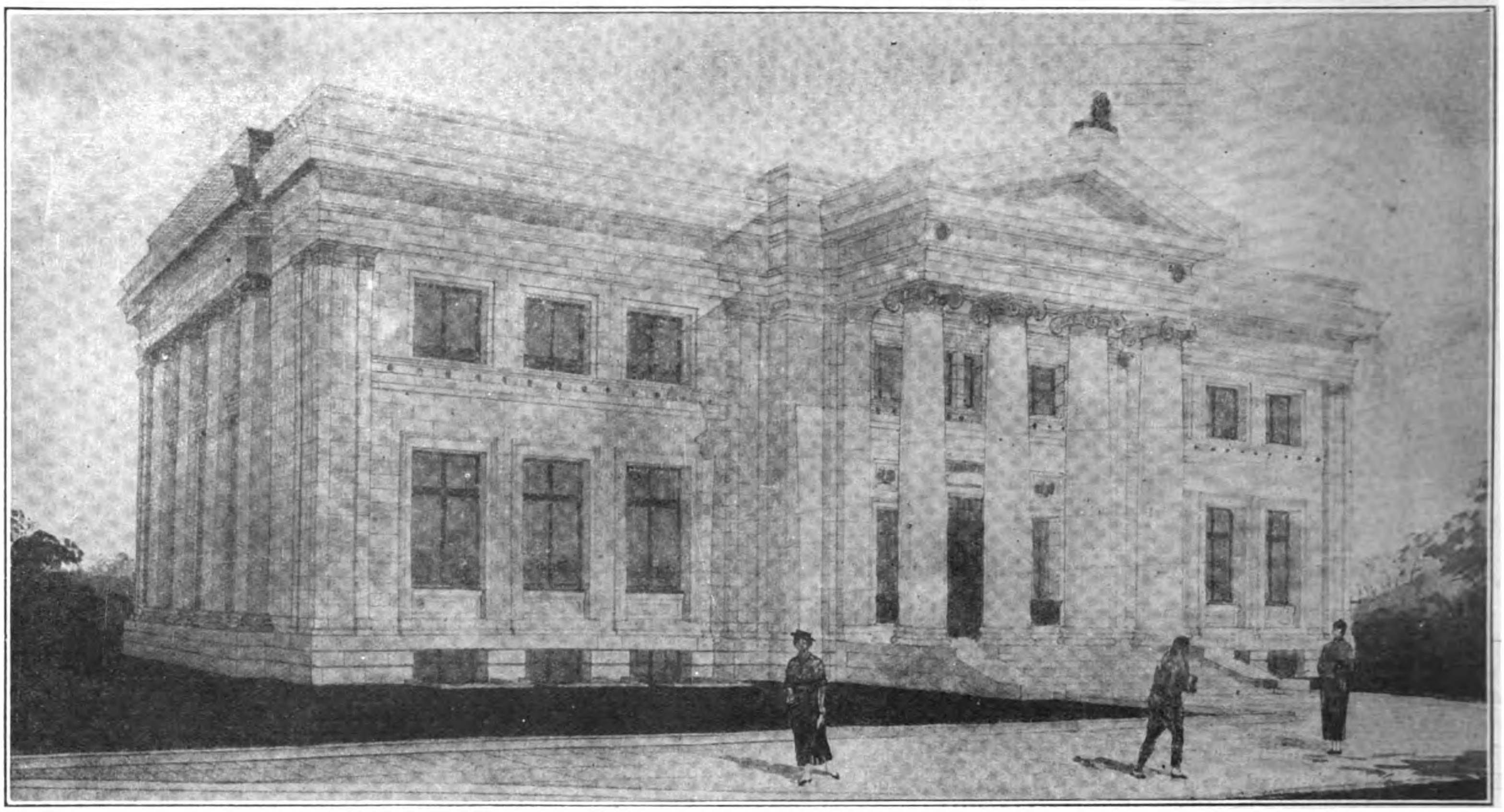
Cochinchina accounts for 72.2 per cent. of the total commerce ; Tonkin for 24.1 per cent.; Annam for 2.5 per cent.; Cambodia for 1 per cent. All the trade of Bambodia and south Annam passes through Cochinchina.



Royal Palacc at Pnom Penh, Cambodia



Museum at Hanoi



LIBRARY BUILDING FOR NATIONAL SOUTHEASTERN UNIVERSITY, NANKING

THE library building for the National Southeastern University, Nanking, designed by and erected under the supervision of Lam, Glines & Co., Inc., architects and engineers, Shanghai, is noteworthy not only because of the merit in the design of the building itself but also for the fact that it is the first building of its kind ever donated to the public by an individual in this country.

When the National Southeastern University found its library facilities inadequate to accommodate the hundreds of ardent scholars who pour in in increasing numbers every year, there rose in response to the need a man with a noble heart and a generous purse. A donation of a considerable sum was offered to the University for the erection of a modern library. The name of the giver is no less great than the donation itself, for he is no other than General Chi, tuchun of Kiangsu. To perpetuate the noble deed, the University has named the library after the governor's father.

As an architectural problem, this library is successfully solved. It is a structure of two stories and a basement. In plan, generally speaking, all public spaces and offices occupy the central portion of the building with the stack room extending into the rear, as by virtue of their functions they should. The reading rooms occupy the two wings and all the mechanical and sanitary equipments go in the basement. This distribution renders the different services of the whole library in perfect harmony and ease.

The architectural design of the building also bespeaks of careful study and selected taste. The order used here is Roman Ionic. The main facade is over 124 feet long and 44 feet high. It is honestly treated in three bays as suggested in plan. The central bay has a portico of four Ionic columns, 28 feet high, crowned by a pediment of singular dignity and simplicity. The freize over this portico bears the inscription " Meng Fong Library " in Chinese, " Meng Fong " being the name of General Chi's father. Under this portico is the main entrance reached by a flight of imposing granite steps. The entrance details of richly panelled oak doors with iron-grilled transom above, framed in a granite architrave with freize and cornice overhead, are decidedly refined in design.

This portico motif is recalled on the side elevations by end-pavilions, having the same number of columns, while on the rest of the wall surface pilasters are used. This treatment at once gives the building accents of interest while at the same time it imparts to it that grace and dignity which a building of this nature must possess.

The interior is also finished in classical treatments, and equipped with the latest in heating, lighting and sanitary installations. The steel book stacks used are specially ordered from America.

The building will cost approximately $160,000.00 and will be ready for use in the Spring of 1923.

The Bank of The Far Eastern Republic

The bank, a semi-governmental institution, was opened with headquarters at Chita on April 25, 1922. The board of directors consists of five members, three representing the government of the Far Eastern republic, one representing the Chita chamber of commerce, and one the centrosoyus, or union of co-operative societies. The bank has an authorized capital of 2,000,000 gold rubles, of which the government proposes to hold 55 per cent. and the remainder is open to subscription by private individuals and firms. Foreigners may buy shares under certain conditions.

Branches have been established in Verhkne-Udinsk, Stretensk, Blagovyeshchensk, Troitz Kossavsk, Bargusin, and Harbin. The Harbin branch of the International Banking Corporation is at present the principal foreign correspondent.

The balance sheet, as of August 1, including the business of the branches, without elimination of duplications, shows total assets of 4,600,654 rubles, excluding 877,950 rubles of shares unsubscribed, but including 659,160 rubles of stock subscriptions not yet paid up.

Powdered Coal: Its Application and Advantages

By W. D. Thom, Chemical Engineer

IN recent years there has been developed a new method of burning coal for heat energy; that is the burning of the coal after it has been ground to powder. Two systems are used in pulverizing coal so that it may be conveyed easily by means of a screw conveyor, by compressed air, or suspended in a stream of low pressure air.* These systems are: (1) The unit system or unit milling plant, in which one machine prepares and delivers the pulverized coal to the furnace; and (2) The multiple system or central milling plant, in which the coal is prepared in a separate building and transported therefrom to the furnaces. The unit system is located adjacent to the furnaces; Fig. 1 is an illustration of this system.

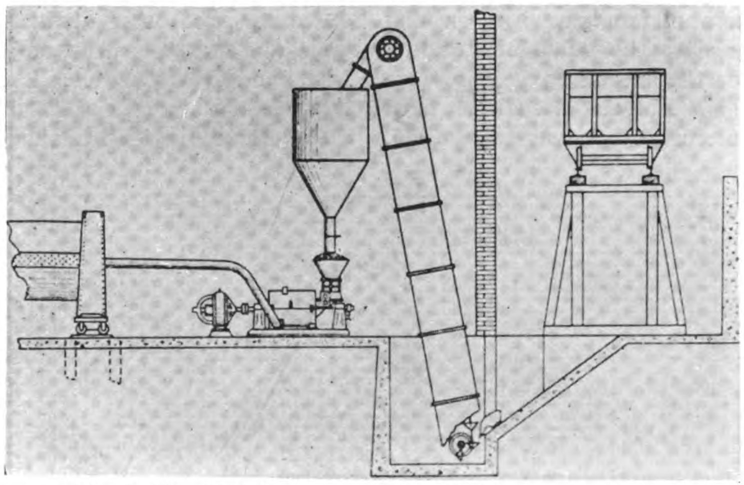


Fig. 1. The Unit System and Aero Pulverizer Supplying Pulverized Coal to Rotary Kiln

It is smaller than the multiple and is very similar in design in different industries. The multiple system is large and is used more extensively than the unit system. It consists of many different pieces of machinery and apparatus, which differ considerably in design in different industries. A diagrammatic illustration of the multiple

* "The Preparation, Transportation, and Combustion of Powdered Coal" by John Blizard, Bul. 564, Canada, Department of Mines.

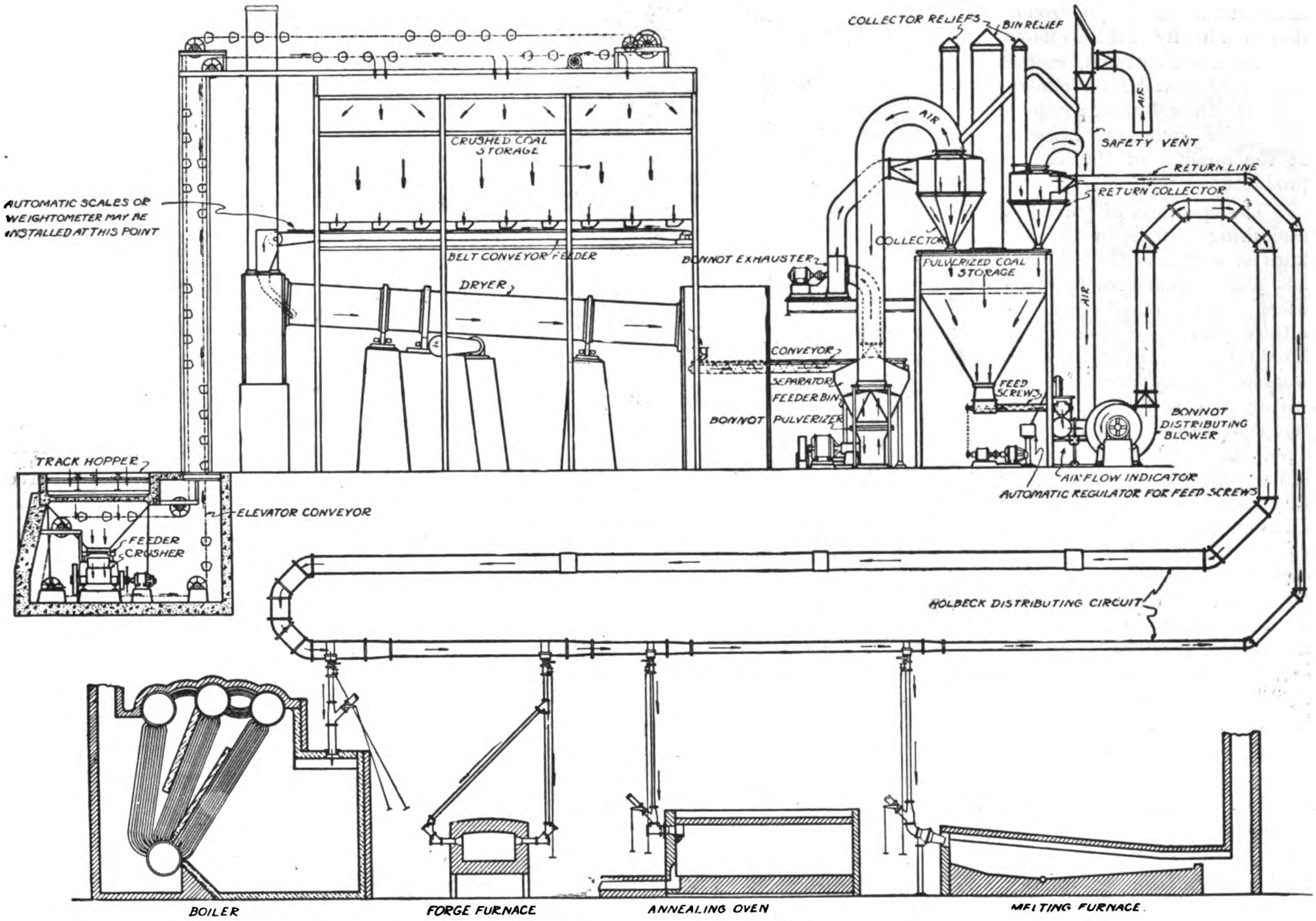


Fig. 2. Diagram of Typical Holbeck System

system is shown in Fig. 2, and the plant as it appeared under construction is shown in Fig. 3.

Both systems have been so well perfected in the United States and Canada that to-day the advantages and economies of pulverized-coal and its uses are extended into practically every industry. It is the purpose of this article to describe briefly the industrial applications of powdered coal and its advantages.

The pioneers in the application of powdered coal were the cement manufacturers, in whose plants the rotary kilns are largely used. In fact, the rotary kilns, where labor cost is greatly reduced, have been made universally possible by the use of powdered coal. The fact that the cement engineers were familiar with crushing and pulverizing problems and appreciate the value of grinding unpalpable powder, is responsible for the success in the presence of discouraging failures in other fields. Pulverized coal has been used in connection with the manufacture of cement since 1895, and to-day this industry uses the most fuel in this form. The consumption in the United States alone amounts to over 8,000,000 tons per year.

The advantages of using pulverized coal in the cement industry are found to be as follows: (1) Absolute control of temperature made possible by the flexibility of operation and simplicity of handling; (2) Absence of smoke and the utilization of practically all the heat units in the coal; (3) Production of a highly luminous flame, creating a concentrated, radiant zone, very desirable for clinkering; (4) The ash of the powdered coal is of secondary influence in the quality of the cement produced.

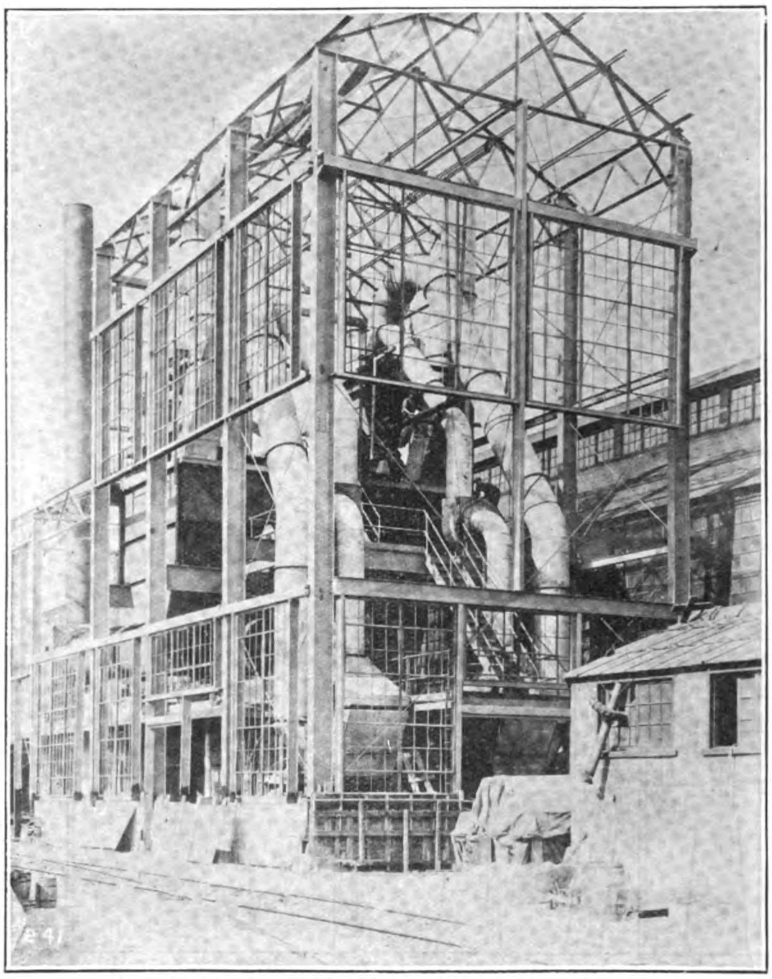


Fig. 3. Powdered Coal Plant of the Holbeck System

The operation of pulverized coal firing systems in the lime kilns as well as in the clay kilns has given valuable results to the users. At the muscle shoals air nitrate plant lime kilns of one hundred tons capacity per day were successfully operated. Fuel saving and perfect control of temperature are distinct advantages. In the kilns of the clay industry saving of fuel as high as fifty per cent. is possible. In addition to this saving the coal can be transported in pipes much the same as gas or oil; this is a considerable saving of labor, especially when the brick yards are large, and the kilns are far apart. Furthermore, compared with hand-firing, the burning period can be materially reduced, because, during the oxidation period, heat can be applied to the utmost. Oxidizing conditions can be maintained throughout the burning, thus reducing the burning period and improving the quality of the ware.

The next general application of powdered coal was in the metallurgical industries. In the iron and steel industry the principal applications are for the following classes of furnaces :—

(1) Heating furnaces: (*a*) Heating, re-heating, and forging; (*b*) continuous heating for blooms and billets; (*c*) annealing malleable iron and steel plates and castings; (*d*) sheet and pair; (*e*) tin and galvanizing pots; (*f*) soaking pits, busheling and puddling.

(2) Melting furnaces: (*a*) Open hearth steel; (*b*) malleable iron; (*c*) gray iron melting.

In the heating, re-heating, and forging furnaces powdered coal has been so successfully used that it is now displacing natural and producer gas, as well as hand-firing. The saving of metal loss, particularly at high temperatures, is very marked. The fuel savings have proved highly satisfactory to the users. (From 150 tp 400 pounds of powdered coal per ton of steel have been saved). Increased output, reduced oxidation, and consequently a better quality of product, simplicity and nicety in the control of flame conditions and temperatures, better working conditions for the operatives, are other distinct advantages. The saving of fuel in annealing furnaces runs from twenty-five per cent. up as compared with hand-firing practice. In addition to this there is a large saving in annealing box renewals. Their life is greatly prolonged ; this is due to the reduction in oxidation, which occurs because of the low percentage of excess air required for complete combustion. This saving frequently is greater than that secured by the conservation of fuel. In the sheet and pair furnaces the advantages of the powdered coal flame over other methods of firing has been conclusively shown, as the percentage of patched sheets and stickers is greatly reduced. Roll breakage, due to the ductility of the steel after it has been heated by the powdered coal flame, is minimized. Due to the fact that with powdered coal firing no time is lost between turns in cleaning the fires, there is less opportunity for the rolls to chill; this also favorably influences the minimizing of roll breakage. A saving in fuel as high as forty per cent., when compared with hand or stoker coal-fired furnaces, is obtained. In heating tin and galvanizing pots, as well as in busheling and wrought-iron puddling furnaces, increased production and a reduction in fuel consumption of twenty-two to forty per cent. is obtained. In addition, labor saving as high as seventy-five per cent. is possible.

The application of powdered coal in melting furnaces has made enormous progress during recent years. In a number of plants furnaces for the melting and refining of steel by the basic open-hearth process are successfully fired with pulverized coal. It is desirable in this type of furnace, in order that the best results may be attained, that the fuel be pulverized so fine that not less than eighty-five per cent. will pass through a two-hundred mesh sieve, and than the ash contents as well as the sulfur, be low, the former not more than eight per cent.

According to N. C. Harrison,* of the Atlanta Steel Company, Atlanta, Georgia, the advantages and disadvantages in the use of powdered coal, as compared with hot producer gas as a fuel for open-hearth furnaces, from observations of its uses up-to-date, are as follows: "All the heat is generated in the furnace, while in the case of gas producer, from 18 to 25 per cent. of the heat units are lost in the producer itself, when converting coal into gas. The higher flame temperature results in a greater number of heats per

* "Pulverized Coal as a Fuel"— *Mechanical Engineering*, August, 1919.

week. Open-hearth furnaces using powdered coal operated on a very low fuel consumption fully equal to the best producer gas practice, and much better than the average of the older plants in this country; at the Atlanta plant the coal consumption is about one-third less than with producer gas. Coal can be pulverized in plants of about 100 tons daily capacity and delivered to the furnaces for approximately 50 cents per ton, which is about the same as the cost for gasifying coal in gas producers.

"The use of this fuel in metallurgical furnaces has been developed to only 75 per cent. of its ultimate value. In our plant this open-hearth furnace has been shut down oftener than the producer gas furnaces of the same size, due to checkers and slag pockets filling up with cinders and slag after 80 heats. We believe, however, that we are gradually overcoming these troubles by decreasing the size of the uptakes and enlarging the slag pockets as mentioned above. Now only the fine particles are going to the checkers and are being blown off daily by compressed air. By this alteration we expect to get much longer life out of the checkers and consequently longer runs out of the furnaces. As a result of this continued development we believe that inside of six months we will obtain a 25 per cent. increase in production over the gas producer furnaces of the same size.

"Sulfur does not give any trouble as long as there is a good draft and the furnace is working hot. We are now using coal with over 1 per cent. of sulfur and getting good results. If checkers get clogged up, and the furnace begins to blow, due to lack of draft, we have trouble with the bath taking up sulfur. The furnace is under complete control of the first helper as to amount of coal being used, as well as air blast and temperature. The flame using the same coal as gas producer is hotter, which allows us to use a greater percentage of scrap per ton of steel, thus reducing the consumption of high-priced pig iron; also it enables us to obtain a greater number of heats per week.

"The finished steel is quieter in the moulds, due to not being over-oxidized, as the coal coming directly in contact with the bath has a greater reducing action. We feel reasonably certain that the oxidation losses are less with pulverized coal than with producer gas. All gas house troubles are eliminated (clearing fires, burning out flues, etc.), although the pulverizing plant must be given attention as to dryness and fineness. Refractory costs have been greater on the furnace using pulverized coal than on gas producer furnaces. I believe, however, than our steadily increasing familiarity with the use of the fuel will enable us to reduce this item nearly to the corresponding cost in producer gas furnaces."

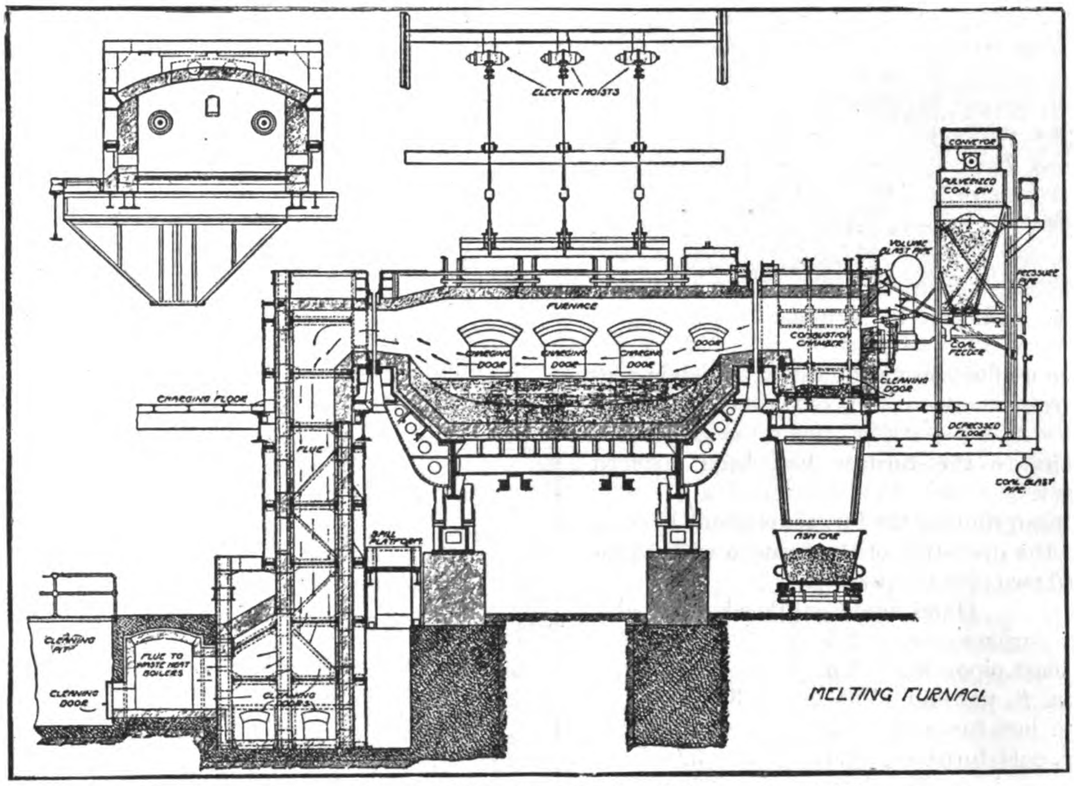


Fig. 4. Open Hearth Furnace Fired with Powdered Coal and Equipped with Waste Heat Boilers

At the basic open-hearth furnaces of the National Malleable Castings Company, Sharon, Pennsylvania, pulverized coal has been used in place of fuel-oil without any sacrifice on tonnage or quality of product in any way and with very gratifying economies. This plant was the pioneer in firing basic open-hearth steel furnaces with pulverized coal, and it has operated successfully and continuously since 1914. Fig. 4 shows an open-hearth steel furnace fired with powdered coal and equipped with waste heat boilers.

The melting of iron by the use of powdered coal in the air furnace for the manufacture of malleable castings was successfully accomplished in 1914. Fig. 5 is an illustration of this. A number of installations have been made in the last few years, which have conclusively demonstrated that there is remarkable economy and convenience in the powdered fuel method as compared with the previous hand-fired method.

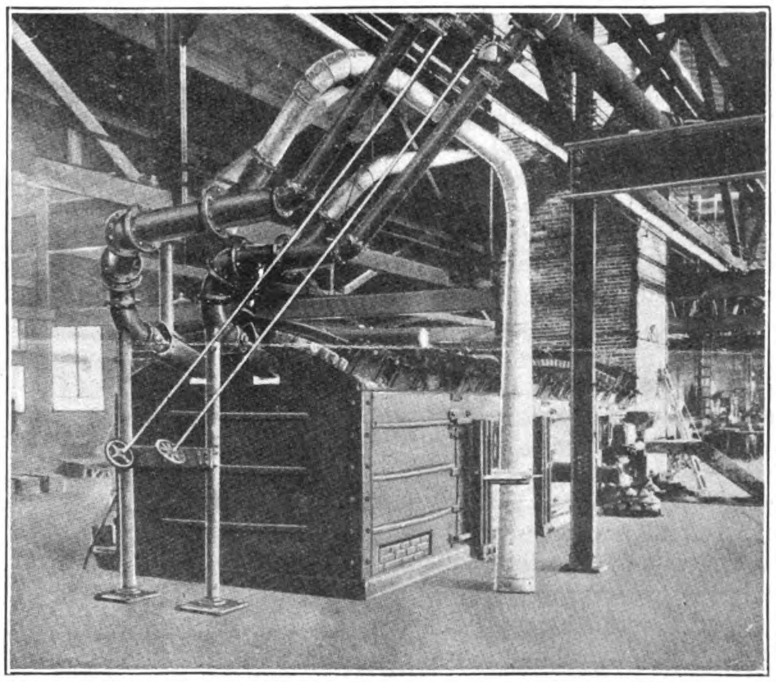


Fig. 5. Furnace for Melting Iron with Powdered Coal (The Holbeck System)

According to F. P. Coffin* of the General Electric Company, Schenectady, New York, the advantages derived in melting iron for malleable castings with powdered coal, as compared with hand-firing, are as follows: "(1) Increased economy. The ratio of coal to iron in hand-firing, under the best conditions, was not over 1 to 2.5, while with pulverized coal the ratio is 1 to 4.5.

"(2) Owing to complete control of melting conditions

* "Pulverized Coal in the Iron and Steel Industry"—*Chem. & Met.* Vol. 25, No. 21, pp. 971-973.

and of the speed of operation the heats may be tapped at exactly the time set in advance. This does not vary more than five minutes from day to day.

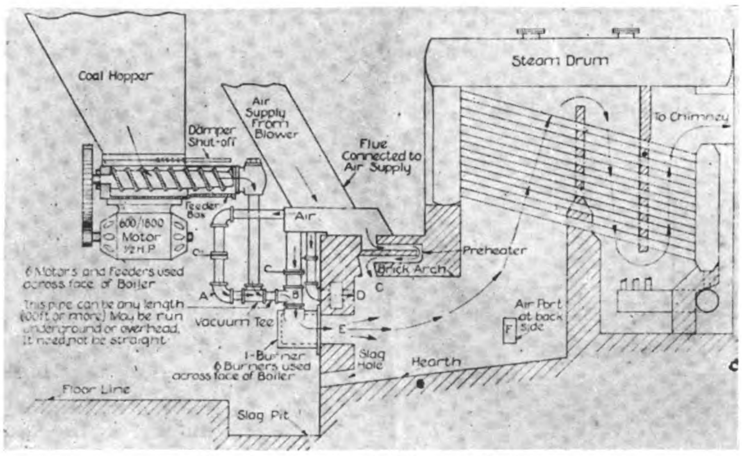


Fig. 6. Sectional View of Boiler

(3) A hotter and more fluid iron is obtained, which is very desirable in malleable iron practice. This cuts down the losses from misrun castings.

(4) Cost of repairs to the furnace has been reduced approximately 5 per cent.

(5) The labor saving in running the furnace is about 1½ m.m.

" A comparison of the operation of the furnace with hand-firing and with powdered coal is as follows :

	Hand-fired Coal	Powdered Coal
Air pressure at furnace—oz.	2.5	0.8
Diameter of main blast pipe—in.	1.8	15.0
Vol. main blast—cu. ft. per min.	3500.0	3500.0
Time of melt—hrs. hot furnace	5.5	3.8
Time of melt—hrs. cold furnace	7.0	5.0
Coal per ton of iron melted—lb.	940.0	600.0

PERCENTAGE OF SAVING

Coal	31%
Pig iron replaced by scrap	18%
Time of melting	30%
Labor	60%
Skimming bars	30%
Cost of repairs	29%

" In comparing the pulverized coal-fired furnace with the hand-fired furnace there are a number of other outstanding advantages which cannot be expressed in figures. These have been summed up as follows : (1) Less slag to dispose of, including all melted ash. (2) Practically no ashes to dispose of. (3) No cleaning of clinkers from the fire-box. (4) No grate bars, no top blast. (5) No smoke at any time. (6) More uniform analysis of castings. (7) Cleaner furnace surroundings. (8) The work is easier on workmen as there is less poking, leveling, and skimming, thus making them more satisfied. (9) Decreased oxidation of the metal."

During the present coal strike in the United States those malleable foundries having pulverizing plants are using a poorer grade of bituminous coal (ash 17 per cent.—sulfur 2 per cent.) because good coal (ash 6 per cent.—sulfur 7 per cent.) is not available. The results obtained are very satisfactory. Only a slight change in the furnace condition is necessary, that is changing the velocity of the draught. Thus it is demonstrated that powdered coal has a distinct advantage in time of emergency.

Success and high efficiency are also attained in the application of powdered coal to the non-ferrous, metallurgical industry. In this industry alone are used from 1,000,000 to 2,000,000 tons of pulverized coal per year. Copper smelting reverberatory furnaces, ore roasting and smelting furnaces, ore melting and reducing furnaces, copper melting furnaces, and brass melting furnaces, are among some of the furnaces in which powdered coal has been successfully applied.

In the reverberatory furnaces for melting copper and other ores, powdered coal has been used very successfully in a number of plants, both in the United States and Canada. In the plants of the International Nickel Company and the Tennessee Copper Company the installation of powdered coal firing in place of hand or grate-firing has shown the following advantages :—

(1) Increased production. Powdered coal firing in one reverberatory furnace smelted 14,272 tons in 1,985 tons of coal per month, while grate-firing in another reverberatory furnace smelted only 7,260 tons with 1,871 tons of coal for the same length of time.

(2) The charging action is continuous; there are no stops for grating ; as the charge in the furnace smelts and runs away, more ore at once comes down from the hopper.

(3) Efficiency is much higher, due to (*a*) Uniform and steady generation of heat; (*b*) complete and rapid combustion at all times; (*c*) combustion taking place where heat is most wanted.

(4) Savings resulted from using cheaper grades of coal ; coal containing as high as 17 to 22 per cent. of ash has been successfully used, whereas in grate firing this is impossible.

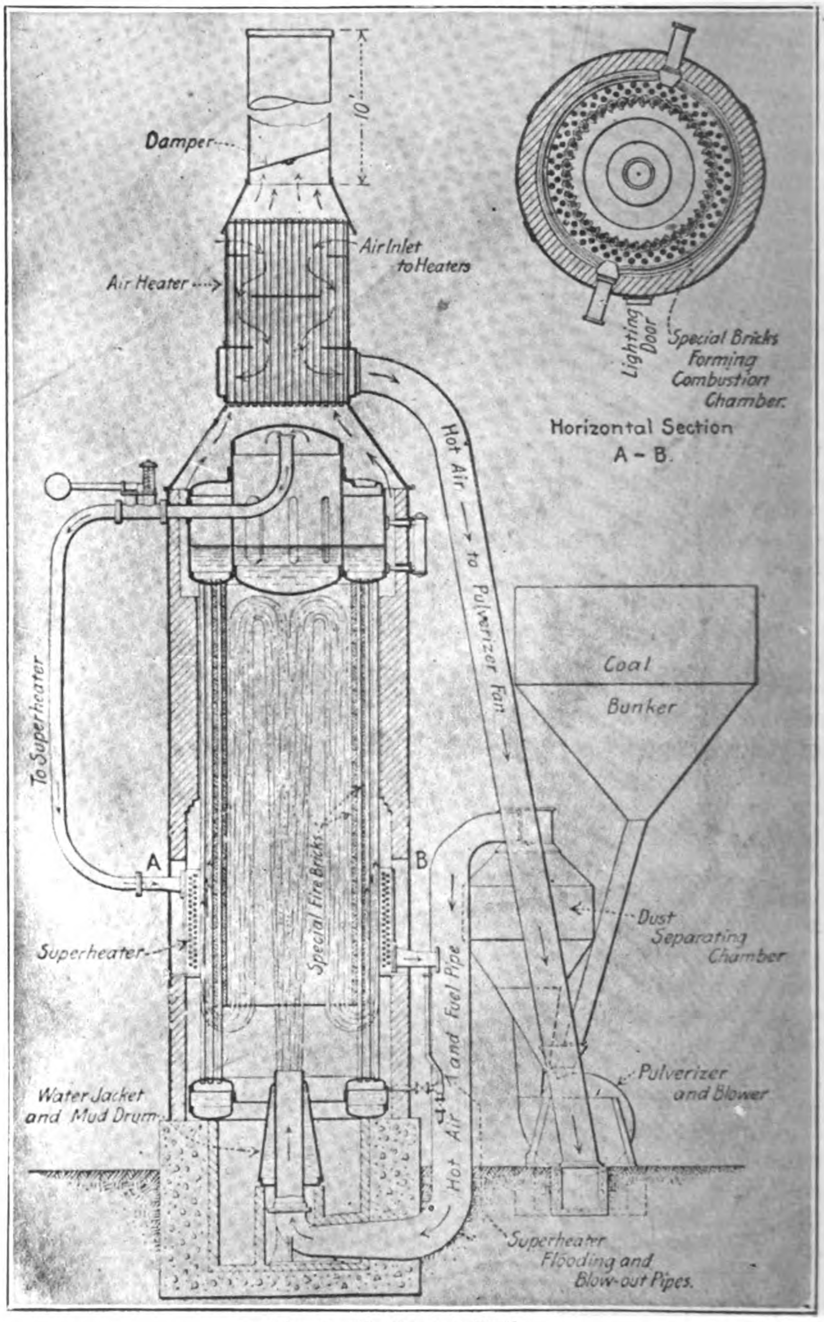


Fig. 7. Bettington Boiler

(5) Flexibility and ease in controlling the flame condition and temperature, which means simplicity and ease in operating the furnace. Furnace firing is controlled by regulating values.

The application of powdered fuel for steam boilers has for many years been uppermost in the minds of engineers and boiler users. They have realized the many advantages and great possibilities in this enormous field. There are records of a number of old, isolated applications of powdered coal to boilers, but it has been only within the past six years that fuel in this form has been accepted by large industrial plants and public utilities for steam generation. The mechanical stoker is now having a keen competition, and it will not be surprising to see the superiority of the new method of firing boilers in the next ten years.

The difficulties first encountered were due largely to incorrect furnace design, not only as regards the general form, but also in regard to the proposition of meeting load conditions, characteristics, and analyses of fuel. The earlier trials were made with bituminous coal, and as the general knowledge of the subject became available, larger projects were undertaken, until at the present time there are a number of plants, such as The General Electric Company, The American Locomotive Company (both at Schenectady, New York), The Milwaukee Electric Railway and Light Company (Wisconsin), and The British Columbia Sugar Refining Company (Vancouver, B.C.), which are of sufficient size and importance, burning pulverized bituminous and anthracite coal and lignite, to furnish a good comparison with similar stations equipped with the stokers.

Fig. 6 shows how the powdered coal equipment was installed at a boiler in the Schenectady works of the General Electric Company.* The boiler was a 500 h.p. Munoz type. A substantial saving was effected in the fuel bill. Efficiency of seventy-five per cent. can be obtained without an economizer.

Fig. 7 is an English type of boiler, designed especially for the use of powdered coal, by Claude Bettington of Johannesburg, South Africa. The flame is projected vertically upward in a brick-lined combustion chamber, surrounded by a circle of vertical tubes. The bricks are cooled by radiation to the tubes. The air is preheated, and a small pulverizer is connected to the tuyere, without intermediate storage for powdered coal. Several of the boilers have been successfully used in South Africa, in Great Britain, and in Canada.

As a result of careful testing and comparison it has been demonstrated that powdered coal for steam generation has the following advantages over the modern stoker boiler plant.†

"(1) Much wider variation in the quality of the coal usable is obtained when coal is burned in pulverized form. All grades of coal are being burned in pulverized form with economy. No stoker will satisfactorily handle all grades of coal. Therefore the use of pulverized coal largely overcomes most troubles due to poor coal, and it is particularly desirable for this reason alone.

(2) The ability to take care of peak loads. In other words, a pulverized coal burning system is much more flexible than a stoker installation. Its flexibility approaches that of fuel oil or natural gas.

(3) By throwing a switch the entire firing operation ceases, an advantage in case of accident or emergency.

(4) Ash is in much better condition to handle. The ash is in the form of dust or slag, depending upon the melting point. This helps to maintain constant furnace temperature, as there are no interruptions in firing conditions on account of cleaning fires.

(5) There are no grates to clinker, particularly after operating at a maximum rating.

(6) Pulverized coal is fired dry, containing less than one per cent. of free moisture, whereas coal burned in stokers may vary in its content of moisture, anywhere from one to ten per cent. of free moisture as fired.

(7) Considerably less excess air is used for complet ecombustion. Less excess air means less power for furnishing air supply, particularly where forced draft is used. With less excess air the stock losses are less. Lower grades of coal fired on stokers require more excess air it is quite difficult for the oxygen to get in close contact with the combustible. An air supply sufficient to furnish all the air for combustion should be available, although at times only fifty per cent. of air need be injected into the furnaces with the coal, the balance being supplied by the induction of action of the burner, or being drawn in by the stack draft. The air going into the furnace should be under control to permit close regulation under all conditions of firing. Less draft is required for pulverized coal furnaces.

(8) All combustibles in the coal are consumed when it is burned in pulverized form, provided the furnace capacity is not exceeded. None of the combustible goes out into the ash pile, and therefore fires in the ash pile are eliminated.

(9) There is less corrosion from sulfur on the boilers, due to less moisture in the coal as fired ; therefore high sulfur coals can be burned more rapidly without serious results.

(10) With furnaces properly proportioned and with properly designed burning equipment, smokeless operation has been maintained indefinitely. This is due to the complete combustion of all the particles of coal before they come in contact with the cold surface of the boiler.

(11) Less refractory troubles have developed due to more uniform furnace temperature conditions.

(12) Steam may be gotten up quickly. In a 400 h.p. rust boiler with cold setting, with feed water about 130 F., steam was raised to 150 pounds, and the boiler cut into line in forty-five minutes. The boiler furnace in which this test was made was only figured for normal rating; the rapidity of firing with pulverized coal equals that of any other fuel."

The burning of powdered fuel has been equally successful in boilers of steam locomotives. The early experimental stage is now passed, and several large railway companies have equipped their locomotive boilers with powdered fuel firing. In the United States installations have been made on the Chicago and Northwestern Railway, the New York Central, and the Delaware and Hudson Railroad. In Brazil, South America, the Central Railway of Brazil has equipped its locomotives for burning powdered coal. In all the applications a double advantage is gained, namely, a method of mechanically stoking a locomotive, and a method of utilizing low-grade fuel which can be had at any place. As a mechanical stoker its only competitor is oil firing, and oil is a high-grade fuel which cannot be had very readily in certain parts of the country.

Mr. F. P. Coffin‡ gave as advantages which powdered coal shares with oil, the following :—

(1) Hand labor is eliminated for firing.

(2) The fire is easily regulated.

(3) Less time is required for raising steam from a cold boiler.

(4) There is less back pressure in the cylinders, due to increase ofarea of exhaust nozzle, strong suction not being required to draw air through coal on the grate.

(5) Less time is required for cleaning fires.

(6) There is freedom from smoke, cinders, and incendiary sparks, which cause fires along the right of way.

(7) More fuel can be burned per hour, hence the engine can do more work.

According to C. F. Herington§ powdered fuel has succeeded because of the following advantages :—

"(1) It offers opportunity for even greater accomplishments in the steam railway field than have heretofore been obtained through use in cement kilns and in metallurgical furnaces.

(2) It produces a saving of from fifteen to twenty-five per cent. in coal of equivalent heat value, as compared with hand firing of

* "The Use of Low-grade Fuels and the Status of Powdered Coal" by F. Parkman Coffin. *General Electric Review*, Vol. 20, No. 8, pp. 606-631.

† "Powdered Coal as a Fuel" by Herington, D. Van Nostrand Co., N.Y, 1920, pp. 256-259.

‡ "The Use of Low-grade Fuels and the Status of Powdered Coal" by F. Parkman Coffin, *General Electric Review*, Vol. 20, No. 8, pp. 606-631.

§ C. F. Herington—"Powdered Coal as a Fuel"—p. 162, D. Van Nostrand Co.

coarse coal on grates. Powdered coal may run as high as ten per cent. in sulfur and thirty-five per cent. in ash, and still produce maximum steam heating capacity; thus otherwise unsuitable and unsalable or refuse grades of coal may be utilized, and hence the saving cost per unit of heat evolved will be a considerable item.

(3) It enables us to maintain fire-box temperatures and sustained boiler capacities equivalent to and exceeding those obtainable from crude or fuel oil.

(4) It maintains the steam locomotive on its present relatively low first cost and expense-for-fixed-charge basis and further reduces the cost of maintenance and operation of large units.

(5) It eliminates the waste products of combustion and fire hazards, and permits the enlargement of exhaust steam passages, thus producing increased efficiency in the cylinders."

With the rapidly decreasing coal supply, the enormous amount of waste, the inconvenience of hand-firing, etc., it can readily be seen that the efficient utilization of fuel supplies is undoubtedly a subject of paramount importance. All the testimony just given shows that America has derived great benefit from employing methods for more efficiently utilizing her fuel resources. The art of burning coal in pulverized form is but another addition to her national security and prosperity. as a result of the satisfactory experiments in America the new art of burning coal has made such a healthy development that it is being recognized, more and more, the world over, as the most promising method of utilizing fuel in the industrial heating operations of the day.

Following the lead of America, England and Canada have spent much time and money in investigating the possibilities of pulverized fuel, and are equipping their industries and municipal lighting and power plants with powdered coal system. Likewise France has installed several large plants for use in metallurgical industries and under boilers, with excellent results. Inspired by the example of larger countries Italy and Belgium, after sending several engineering committees to the United States to investigate the advantages of powdered coal and the success ascribed to it, are convinced of its practicability. Several South American countries, after considerable investigation, are adopting pulverized coal in their industries, chiefly in railroad transportation, and in metallurgical works.

In contrast to the foresight of the countries just mentioned, those of the Far East, China in particular, have done little to provide for the conservation of natural resources. These countries, with their huge populations and their rapid development in industry and commerce, must economically utilize their fuel and other natural resources. Consequently anything that can be done to increase the efficiency of generating heat and power from coal, or economically curtailing the use of fuel-oil (which is costly and is imported annually in large quantities), by the substitution of powdered coal, should be immediately attempted. In view of the purpose of this article, the following table sets forth concisely the advantages of powdered coal:

TABLE

Savings Possible	Other Advantages
(1) Fuel—20-50%	(1) No smoke nuisance.
(2) Labor—25-75%	(2) Flexibility of operation and control.
(3) Oxidation loss—40-75%	(3) More perfect combustion.
(4) Furnace repairs—25-60%	(4) Utilization of low-grade solid fuel.
(5) Disposal of ash—50-75%	(5) More uniform heat.
(6) Grate bars and firing tools—100%	(6) Increased production.
	(7) Cleaner furnace surroundings.
(7) Kindling wood—90%	(8) Automatic handling of coal.
	(9) Boon to the workmen.
	(10) Requirement of less expensive stack.

Chinese-American Co-operation

Buying German Telephone Instruments

IN contrast to the success attained by Japanese-American co-operation in the manufacture of telephone apparatus, is the somewhat doleful story attending co-operation of the same American company with Chinese. Although the Chinese government through the ministry of communications have subscribed to twenty-five per cent. of the shares of the China Electric Company (a combination of the Western and Nippon Electric Companies), it is now reported as specifying German telephones in recent tenders. The situation as reported, shows that the China Electric Company having many accounts overdue have insisted upon cash with all new government orders, and the government, in return for long-term payments, have rejected their own industry and specified to German instruments.

In present tenders for the supply of Chinese government telephones and accessories, delivery is specified not in Shanghai or in any of the ports, but at the actual place of installation, calling for the addition of customs duties, government railway freight charges, and the shipper to be responsible for damage and theft in transit. Under the present conditions in China, it is difficult to get foreign firms to comply with these terms.

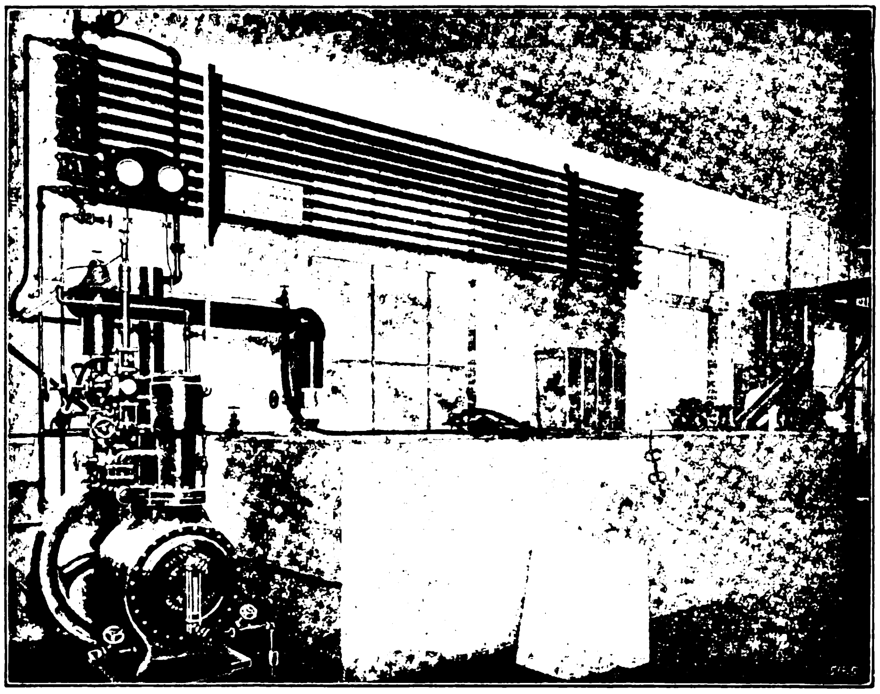
Governmental Telephones in China

TELEPHONE systems installed by and operated under the auspices of the ministry of communications in China are as follows:

Harbin (Kirin)	Ashiho (Kirin)
Taonan (Fengtien)	Kweiyang (Kweichow)
Fulungchuan (Kirin)	Changling (Kirin)
Itung (Kirin)	Shasi (Hupeh)
Kirin (Kirin)	Changchun (Kirin)
Shwangchen (Kirin)	Chefoo (Shantung)
Taiyuan (Shansi)	Changchow (Honan)
Kingchow (Hupeh)	Yangchow (Kiangsu)
Soochow (Kiangsu)	Wuhu (Anhwei)
Kiukiang (Kiangsi)	Shanghai (Kiangsu)
Nanking (Kiangsu)	Pukow (Kiangsu)
Chinkiang (Kiangsu)	Tanku (Chihli)
Hankow (Hupeh)	Wuchang (Hupeh)
Hanyang (Hupeh)	Peking (Chihli)
Tientsin (Chihli)	Paoting (Chihli)
Tunghsien (Chihli)	Lungan (Szechuan)

The following are private telephone companies, which have been registered with the ministry of communications:—

Kao-yang Telephone Co.			Kao-yang, Chihli.
Ho-chien	,,	,,	Ho-chien, Chihli.
Kiang-yin	,,	,,	Kiang-yin, Kiangsu.
Ta-chung	,,	,,	Nantungchow, Kiangsu.
Chang-shu	,,	,,	Changsu, Kiangsu.
Quinsan	,,	,,	Quinsan, Kiangsu.
Hsuchow	,,	,,	Hsuchow, Kiangsu.
Kiangsi	,,	,,	Nanchang, Kiangsi.
Hsia-shih	,,	,,	Haining, Chekiang.
Amoy	,,	,,	Amoy, Fukien.
Antung	,,	,,	Antung, Fengtien.



BRUNSWICK ICE PLANTS

Here is the illustration of a typical standard Brunswick ice plant. It shows a plant which will produce two tons of ice daily. We also manufacture standard plants varying in capacity from two hundred fifty pounds to six tons. These plants are furnished for either steam or belt drive and are especially adapted to small towns, haciendas, plantations, large camps, cantonments, hospitals, etc.

These plants are the finest of their kind. No pains have been spared to make them in every respect as perfect as possible. Their construction is simple. Their parts are few and interchangeable. They are strong, sturdy and rugged-built to stand hard usage and wear well. The running parts move free and true; the action is smooth and easy; the alignment of parts precise.

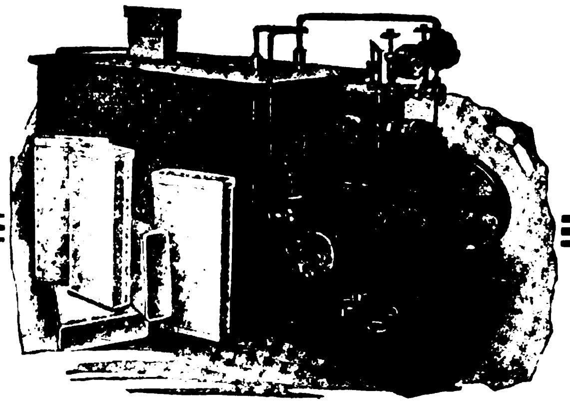
We want you to investigate these Brunswick ice plants if you are interested in ice-making machinery. You will find them built right, easy to operate, wonderfully efficient and dependable in every respect. Blue-prints and detailed instruction for installation and operation furnished with each plant.

A small, portable type is shown below. Detailed description in your own language on request.

Brunswick

BRUNSWICK—KROESCHELL CO.,

DEPT. 2, NEW BRUNSWICK, N.J., U.S.A.



NIPPON MENKWA
KABUSHIKI KAISHA

(THE JAPAN COTTON TRADING CO., LTD.)

LARGEST IMPORTERS AND EXPORTERS
IN THE FAR EAST

COTTON
COTTON YARN
COTTON PIECE GOODS
RAW SILK
WOOL
GENERAL COMMISSION MERCHANTS

Established 1892

HEAD OFFICE: No. 10 2-Chome, Nakanoshima, OSAKA, JAPAN
SHANGHAI OFFICE: 8 Hankow Road
TIENTSIN OFFICE: 42 Rue de France, French Concession

Capital Subscribed-	Yen 50,000,000.00
Capital paid-up	Yen 20,250,000.00
Reserve Funds	Yen 26,825,000.00

MATAZO KITA, Esq., *President*
ATUSHI YAMADA, Esq., *Vice-President*

Directors :

K. SUYEYOSHI, Esq. G. IMAMURA, Esq. R. NAKAMURA, Esq.
H. OHOKA, Esq. T. SHIKATA, Esq. K. KUSUMOTO, Esq.
T. YASUI, Esq.

BRANCHES: Semba (Local), Dairen, Shanghai, Hankow and Bombay
AGENCIES: Kobe, Yokohama, Tokyo, Seito, Tientsin, Newchwang, Tiehling, Changchung, Harbin, Hongkong, Calcutta, Karachi, Rangoon, Alexandria, Liverpool, New York and Buenos Aires
SOLE BUYING AGENCY IN U.S.A.: Japan Cotton Trading Company of Texas, Fort Worth, Texas
SOLE BUYING AGENCY IN COREA: Corea Cotton Trading Company, Limited
FACTORIES: Cotton Press at Hankow, Cotton Gins and Presses in India

When You Go to America

Establish Acquaintance—A traveler making his Statler reservations need only address the first Hotel Statler he will visit. This hotel will take care of reservations in the other Statler cities, will assist him in getting in touch with people he wants to see, and will serve him in many other helpful ways.

There are five cities of the United States which you will almost certainly want to visit—and in each of them is a Statler-operated hotel. In all these hotels every room has a private bath and many other unusual and much-appreciated conveniences. In all of them especial attention is paid to the traveler from overseas. In any of them you can be sure that you are getting the best there is, at prices no higher than in other hotels of the first class.

ST. LOUIS — Hotel Statler
CLEVELAND—Hotel Statler
DETROIT — Hotel Statler
BUFFALO — Hotel Statler
NEW YORK—Hotel Pennsylvania

There will be another Hotel Statler, in Boston. It will have 1100 rooms and 1100 baths; opening date to be announced later.

Hotels Statler

This small picture of Hotel Pennsylvania will give you some idea of its size.

How to Reserve Accommodation

Reservations for accommodation at any of the Statler Hotels or Hotel Pennsylvania can be made at any office of Messrs. Thos. Cook & Son; or at principal hotels and steamship offices in the larger cities of the Orient; or at the offices of the Asia Banking Corporation in Shanghai, Hong Kong, Peking, Tientsin, Hankow, Canton, Singapore and Manila. Reservations so made can be depended upon absolutely.

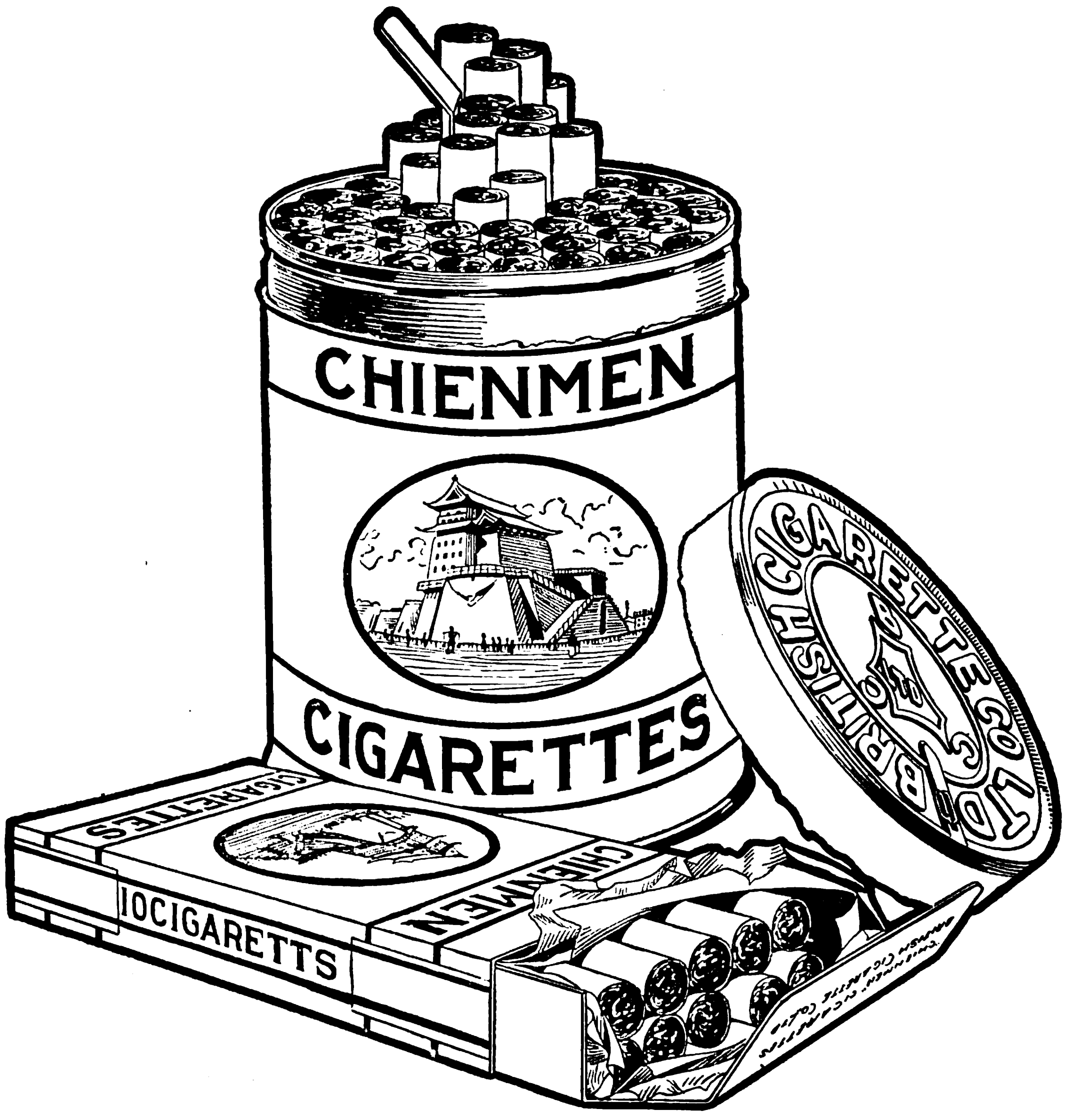
Hotel Pennsylvania

NEW YORK

Opp. Pennsylvania Terminal—**The Largest Hotel in the World**—2200 Rooms, 2200 Baths

CHIENMEN

Cigarettes

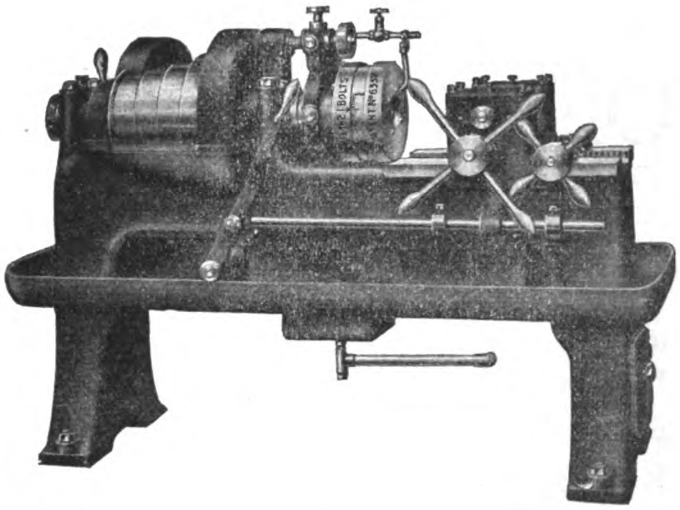


A brand well known to the "High Grade
Cigarette Smoking Public" of China.

BRITISH-AMERICAN TOBACCO CO. (CHINA), LTD.

Distributors

Heap's Patent Screwing Machines



are made in all sizes, and suitable for dealing with all classes of work.

The illustration opposite shows our 2in. Patent Automatic Bolt Screwing Machine which is one of a complete line of Single and Multiple Head Machines specially designed for use wherever large quantities of Bolts have to be dealt with in the most expeditious and economical manner.

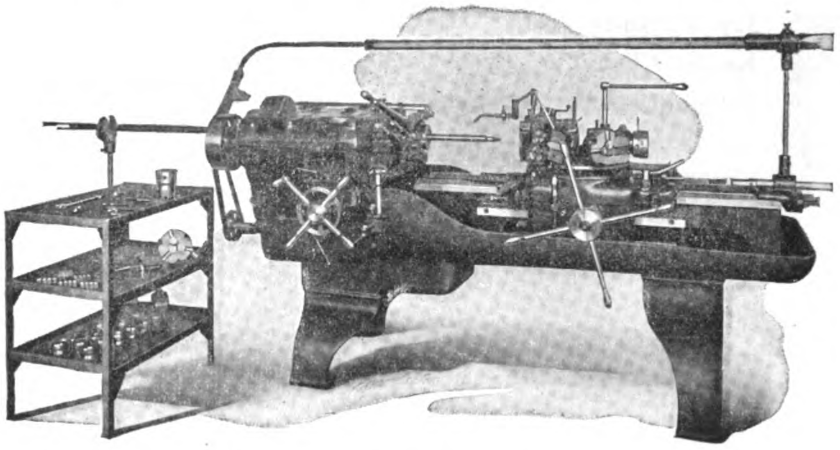
We will gladly advise you as to the most suitable machine for your particular class of work.

Catalogue free on request.

JOSHUA HEAP & CO., LTD.,

ASHTON-UNDER-LYNE, ENGLAND.

For the Small Shop or the Large One



The Hartness Flat Turret Lathe *fits the small shop*—even the shop so small that it has only just broken the habit of making a piece at a time. The Hartness Flat Turret Lathe *made a lasting reputation* for itself in the days of the small shop, on work which was *put through in small lots*. Its universal tool equipment was specially designed for this condition. The machine has since been *tremendously improved;* the improvements have increased its effectiveness *for small lot manufacturing,*

At the same time, the Hartness Turret Lathe is the *standard machine for large-lot manufacturing in big establishments*. The strength, stiffness, power and accuracy of the machine have given it a place held by no other. On bar or chuck work within its rang *its output per machine or per dollar of investment is unmatched.*

Catalogue and descriptive literature sent post free on request.

Jones & Lamson Machine Company

9-10 Water Lane, London, England
Cable Address: "Turretorum" London

Springfield, Vermont, U.S.A.
Cable Address: "Turret" Springfield, Vt.

THE BANK OF CHOSEN

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor : S. Minobe, Esq.
Deputy-Governor : T. Kano, Esq.

Directors :

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT : TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY :

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE :

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL - - - - - - - U.S. $5,000,000

SURPLUS AND UNDIVIDED PROFITS - - 10,458,137

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK

LONDON OFFICE: 36 BISHOPSGATE, E.C.

LYONS OFFICE: 27 PLACE TOLOZAN

SAN FRANCISCO OFFICE: 232 MONTGOMERY STREET

BRANCHES:

CHINA
- SHANGHAI
- PEKING
- TIENTSIN
- HANKOW
- HARBIN
- HONGKONG
- CANTON

DOMINICA
- SANTO DOMINGO
- SANCHEZ
- SAN FRANCISCO
- SAN PEDRO
- SANTIAGO
- PUERTO PLATA
- BARAHONA
- LA VEGA

INDIA
- BOMBAY
- CALCUTTA
- RANGOON

JAPAN
- YOKOHAMA
- KOBE

JAVA
- BATAVIA
- SOURABAYA

PANAMA
- PANAMA
- COLON

PHILIPPINES
- MANILA
- CEBU

SPAIN
- BARCELONA
- MADRID

STRAITS SETTLEMENTS
- SINGAPORE

We are also able to offer our Customers the services of the Branches of the National City Bank of New York in the principal countries of South America, Central America and in the West Indies.

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current Accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

H. C. GULLAND, *Manager.*

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital	**Frs. 72,000,000**
Reserves	**„ 70,000,000**

HEAD OFFICE: 96 BOULEVARD HAUSSMANN, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Noumèa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

JUGO GINKO, LIMITED

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugo Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-up Y. 49,750,000 Reserve Funds Y. 23,900,000

***President*: The Hon. Iwao Matsukata *Vice-President*: Masayasu Naruse, Esq.**

***Managing Directors*: Yutsuha Sato, Esq. and Kanesato Aiko, Esq.**

***Head Office Manager*: Sei Usagawa, Esq.**

***Head Office*: No. 6, 7chome, Kobiki-cho, Kyobashiku, Tokyo.**

BRANCHES:

SHIMBASHI, MARUNOUCHI, GOFUKUBASHI, TOHORISANCHOME, KAKIGARACHO, NINGYOCHO, RYOGOKU, FUKAGAWA, KANDA (TOKYO). OSAKA, SENBA, TAMATSUKURI, NISHI, KUJO, MINAMI, NAMBA, TENNOJI, KITA, TENGACHAYA (OSAKA), KOBE, SAKAEMACHI, FUKIAI, HYOGO (KOBE). KYOTO, NAGOYA, SAKAI, WAKAYAMA, NISHINOMIYA. OKAYAMA, HIROSHIMA, SHIMONOSEKI, FUKUOKA, KUMAMOTO, KAGOSHIMA, SENDAI.

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD. LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD.
UNION DISCOUNT CO. OF LONDON, LTD.

A Bank with 700 Branches.

YOUR BUSINESS in Canada, Central and South America, Cuba and throughout the West Indies can be promptly and efficiently handled by our branches in these countries. We shall be pleased to act as your correspondent for Letters of Credit, &c.

The Royal Bank of Canada

HEAD OFFICE: MONTREAL.

600 branches in Canada and Newfoundland.
100 branches elsewhere.

LONDON, ENG. NEW YORK, U.S.A.
PARIS, FRANCE. BARCELONA, SPAIN.

The First National Bank of Boston

The leading financial institution of New England

Foreign and domestic commercial banking of every nature.

Correspondence solicited.

THE BANK OF TAIWAN, LTD.

Established 1899

TAIPEH, FORMOSA, TAIWAN

Tokio Branch: No. 1 Eirakucho, 2 Chome, Kojimachi

Telegraphic Address: TAIWANGINK

Telephones: 1060,1066,446,449 Marunouchi

Capital Subscribed	Y. 60,000,000
Capital Paid-up	Y. 52,500,000
Reserve Funds	Y. 11,780,000

President :
Kojuro Nakagawa, Esq.

Directors :
Gunji Kawasaki, Esq.
Kumematsu Morinaga, Esq.
Masumi Esaki, Esq.
Tadasu Hisamune, Esq.
Denkichi Takita, Esq.

Branches :

Japan:	Tokyo, Kobe, Moji, Osaka, Yokohama.
Taiwan:	Keelung, Tainan, Takow, and 11 others.
China:	Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
London:	25 Old Broad Street.
New York:	165 Broadway, Benenson Investing Bldg.
Others:	Bangkok, Batavia, Bombay, Hongkong, Semarang, Singapore, Soerabaia.

AGENTS and CORRESPONDENTS

In the Principal cities and towns throughout the World. Interest allowed on fixed Deposits and Current Accounts on terms which may be ascertained on application. Most favorable terms are granted to Petty Current Accounts. Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Strait Settlements, East Indies, Australia, Great Britain, America, Canada and South Africa, etc.

K. NAKAGAWA *President.*

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED - - - - - Yen 50,000,000

HEAD OFFICE:

MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:

TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:

NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

THE SUMITOMO GOSHI-KAISHA

OSAKA, JAPAN

OWNERS OF BESSHI COPPER MINE, COAL MINES, SILVER AND GOLD MINES, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper, Brass, Bronze and other Alloys, Solid and Drawn Steel Tubes, Nails, Etc.—Superphosphate and Composite, Manure, Sulphuric and Nitric Acid, etc.

GENERAL WAREHOUSE BUSINESS AND FORESTRY ENTERPRISES

WORKS AND DEPARTMENTS

Warehouses ... ... Osaka, Kobe & Tokyo
Mining Offices ... ... Besshi, Wakamatsu, Sapporo & Ohgayu
WORKS:
Copper Works ... ... Osaka
Fertilizer Works ... ... Niihama
Sales Departments .. .. Osaka, Kobe, Tokyo, Kure, Yokosuka, Hakata, Shanghai, Hankow and Tientsin

THE SUMITOMO STEEL WORKS, LTD.

OSAKA, JAPAN

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of Every Description for Railways, Shipbuilding Yards, Mines, Hydraulic Electric and Other Engineering Works, etc., etc.

THE SUMITOMO ELECTRIC WIRE & CABLE WORKS, LIMITED

OSAKA, JAPAN

MANUFACTURERS OF

Copper, Brass, Bronze and Nickel Wires and Strips, Trolley Wires, Insulated Wires and Cables of Every Description for Telephone, Telegraph, Lighting, Power Transmission, etc., etc.

THE SUMITOMO BANK, LIMITED

Head Office: OSAKA, JAPAN
Cable Address: "SUMITBANK"
President: Baron K. SUMITOMO
Established March, 1912
(Successors to The SUMITOMO BANK)

Capital Subscribed	**Yen 70,000,000**
Capital Paid-up	**„ 50,000,000**
Reserve Fund	**Yen 23,100,000**
Deposits	**„ 369,000,000**

Head Office: Kitahama, Osaka
City Offices: Semba, Bingomachi, Nakanoshima, Dotonbori, Kawaguchi, Tenma, Nipponbashi.
Home Branches: Tokyo (Tokyo, Toriaburacho, Fukagawa, Shinbashi, Asakusa), Marunouchi, Yokohama, Nagoya, Kyoto (Kyoto and Nishijin), Kobe (Kobe and Hyogo), Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Wakamatsu, Kokura, Hakata and Kurume.

Foreign Branches: Shanghai, Hankow, Bombay, London, New York and San Francisco.

Agents: The Sumitomo Bank of Hawaii, Ltd., Honolulu, Lloyds Bank, Ltd., London, National City Bank of New York, New York.

Correspondents: In all important places at home and abroad.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

CHAIRMAN:

Mr. Manzo Kushida

MANAGING DIRECTORS:

Mr. Mikitaro Kikuchi Mr. Kiyoshi Sejimo
Mr. Takeo Kato

HEAD OFFICE:

No. 3 Yayesucho Nichome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

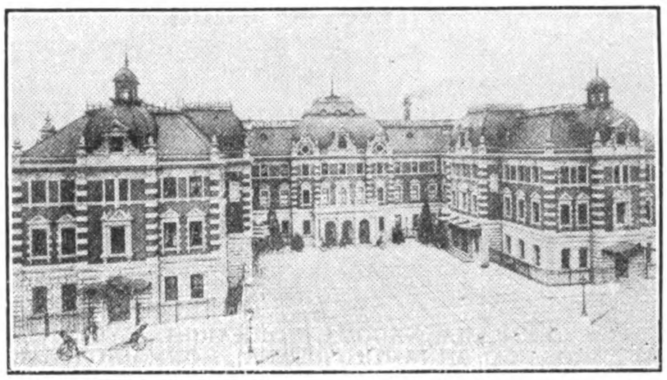
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Semba (Osaka), Kobe, Sannomiya (Kobe), Kyoto, Nagoya, Otaru, Shanghai, New York and London.

General Banking and Exchange Business

Agents for the Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed.............Y. 100,000,000.00
Capital Paid-Up....................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

NIHONBASHI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.
New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.
Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.
Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital	- - -	**Yen 50,000,000.00**
Paid-Up Capital	- - - -	**Yen 36,350,000.00**
Reserve Fund	- - - -	**Yen 33,500,000.00**

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:

No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.

T. AKASHI, *Manager*

CITY BRANCHES:

ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:

YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:

SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York; The National Bank of Commerce in New York; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:

The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE ONE HUNDREDTH BANK, LTD.

(DAI HYAKU GINKO)

HEAD OFFICE, AWOMONO-CHO, TOKYO

TOKYO BRANCHES: No. 1 Torihatagocho, Nihonbashi: No. 10, Ginza Nichome, Kyobashi
YOKOHAMA BRANCH: Nos. 53-55 Honcho Shichome
OSAKA BRANCH: 28 Bingo-machi, Nichome
KYOTO BRANCH: Shijo Higashinotoin
SHINMACHI BRANCH: Shinmachi Dori Sanchome

President: K. IKEDA, Esq.

Managing Director: S. CHOH, Esq.

SUBSCRIBED CAPITAL	- - - - -	Yen 25,000,000
CAPITAL PAID-UP	- - - - - -	Yen 17,500,000
RESERVE FUND	- - - - - -	Yen 8,094,340
DEPOSITS	- - - - - - - -	Yen 110,740,264

Transacts General Banking and Foreign Exchange Business. Conducts Trust Company Business

Hongkong and Shanghai Banking Corporation

Paid-up Capital		$20,000,000
Reserve Funds:	Sterling	£4,500,000
	Silver	$23,500,000
Reserve Liability of Proprietors		$20,000,000

Court of Directors:

G. M. DODWELL, Esq., Chairman

Hon. Mr. A. O. LANG, Deputy Chairman

D. G. M. BERNARD, Esq.
G. T. M. EDKINS, Esq.
P. H. HOLYOAK, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
A. M. BOWES SMITH, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY	LONDON
BANGKOK	LYONS
BATAVIA	MALACCA
BOMBAY	MANILA
CALCUTTA	NAGASAKI
CANTON	NEW YORK
CHEFOO	PEKING
COLOMBO	PENANG
DAIREN	RANGOON
FOOCHOW	SAIGON
HAIPHONG	S. FRANCISCO
HAMBURG	SHANGHAI
HANKOW	SINGAPORE
HARBIN	SOURABAYA
ILOILO	SUNGEI PATANI
IPOH	TIENTSIN
JOHORE	TSINGTAO
KOBE	VLADIVOSTOCK
KUALA LUMPUR	YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

OSTER
BELT *and* MOTOR

COMBINATION THREADING MACHINES
STRAIGHT PIPE - BENT PIPE - NIPPLES - BOLTS

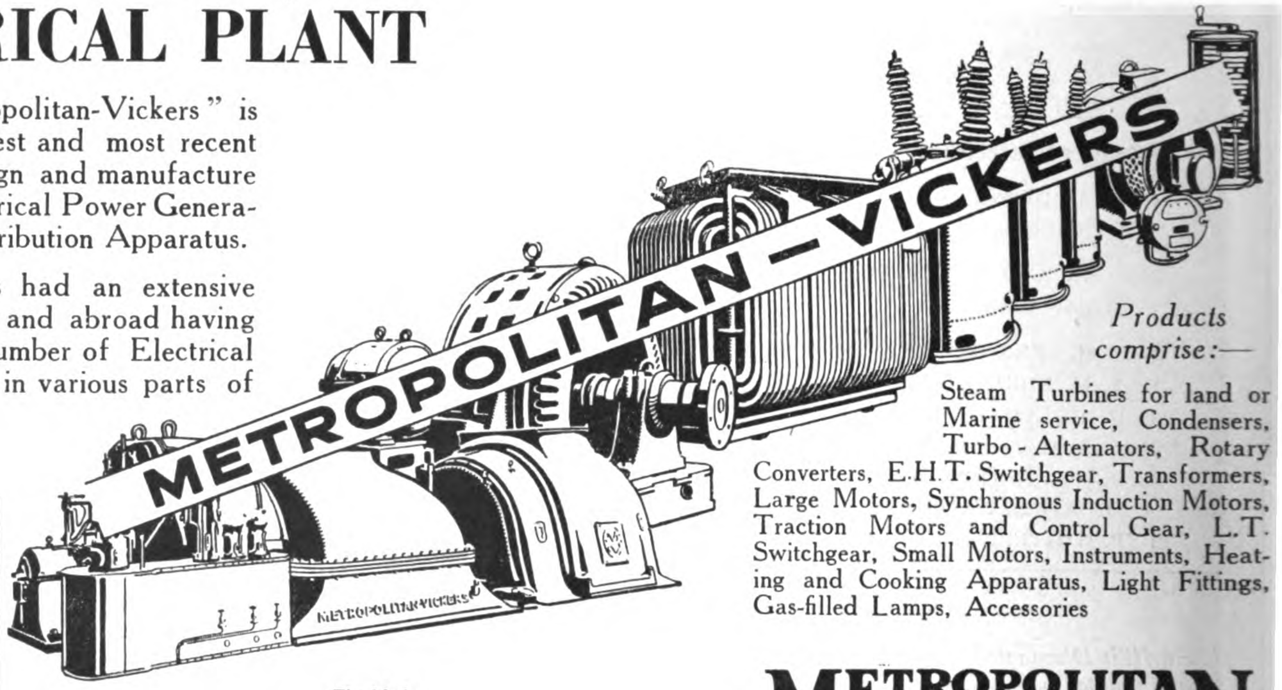
4 days' work a month for this machine is sufficient to make it show handsome dividends over hand-threading. So simple that a boy can operate it, it takes care of the rush repeat job or the extensive installation in the speediest, easiest way. And in between it reclaims scrap pipe into valuable nipples. Write for "*Pipe-Threading Profits*", 16 pages of users' testimony.

THE OSTER MFG. CO.
Specialists in Hand and Power Threading Equipment
East 61st Place Cleveland, Ohio

This name should be on all your ELECTRICAL PLANT

The name "Metropolitan-Vickers" is indicative of the best and most recent practice in the design and manufacture of all kinds of Electrical Power Generation Plant and Distribution Apparatus.

The Company has had an extensive experience at home and abroad having equipped a large number of Electrical Power Installations in various parts of the world.



Products comprise:—

Steam Turbines for land or Marine service, Condensers, Turbo-Alternators, Rotary Converters, E.H.T. Switchgear, Transformers, Large Motors, Synchronous Induction Motors, Traction Motors and Control Gear, L.T. Switchgear, Small Motors, Instruments, Heating and Cooking Apparatus, Light Fittings, Gas-filled Lamps, Accessories

Agents for China:

Messrs. Arnhold Bros. & Company, Limited,

SHANGHAI

Tientsin, Hankow, Peking, Changsha, Newchwang, Chungking, Mukden, Ichang, Harbin, Shansi, Hongkong, Canton

The Mark of Efficiency

METROPOLITAN Vickers ELECTRICAL CO. LTD.

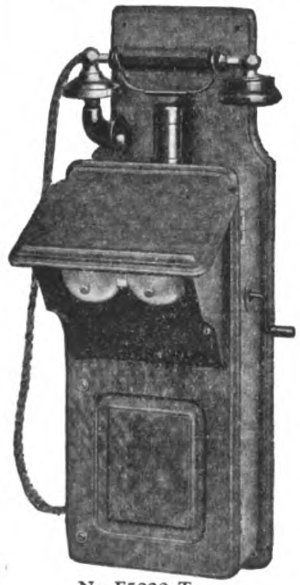
TRAFFORD PARK - - - - - - - MANCHESTER

ENGLAND

2046C

The Standard Telephones Used Throughout the World

Kellogg Telephones Give MORE SERVICE VALUE for the Money Than Any Other Telephone on the Market



No. F5020 Type
MAGNETO SET

The powerful generator will signal every telephone on the line with a clear, loud ring.

The reliable non-adjustable ringer with heavily enameled brass gongs gives a pleasing, distinct signal.

The Kellogg transmitter is known the world over for its wonderful transmitting qualities—it is in a class by itself.

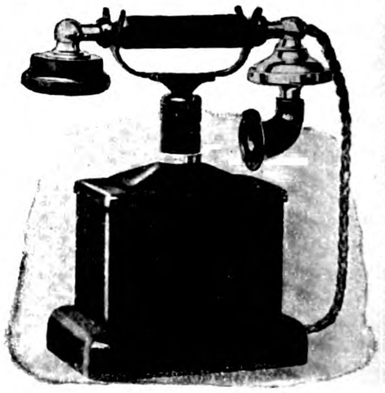
The bi-polar, extra sensative receiver with the non-breakable Kellogg Bakelite shell brings the voice to your ear with astonishing clearness.

The carbon arrester furnishes the required protection from lightning.

The cabinet is exceptionally well constructed and finished in golden oak. Metal phones finished in black enamel.

Use Is the Test

Order Your Telephone Requirements Today —Prompt Shipments



No. 120 Type
COMMON BATTERY SET

KELLOGG SWITCHBOARD AND SUPPLY CO.

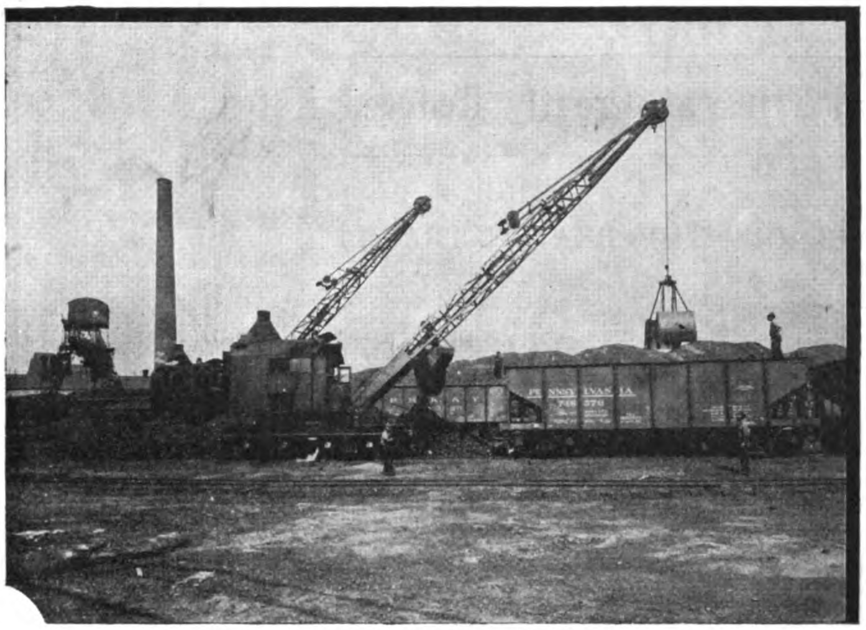
Far Eastern Branch, No. 62 Kiangse Road, Shanghai

General Offices and Factory, Chicago, U. S. A.

Builders of High Grade Telephone Equipment for 25 Years

BROWNING

LOCOMOTIVE CRANES



An Investment with a Dozen Profits—

A Browning owner usually buys a Browning for one purpose—and then finds himself profiting in a dozen other ways, some quite unexpected.

For example, many a Browning more than pays interest on its investment simply by its side-job as a private switch engine—all its major work counts as pure profit. Many a Browning bought simply to handle coal at the power plant finds itself in steady demand in other parts of the yard on wholly different tasks.

In considering a crane purchase, keep in mind these three distinctive points about a Browning—

(1) Designed for all around usefulness in bucket, grapple and magnet work, also steam shovel and pile driver attachments.

(2) Solidly constructed for long trouble—free performance on each job.

(3) Notable for economical performance.

It will pay you to buy the savings a Browning will earn for you.

Export Department

The Browning Company

Cleveland, Ohio, U. S. A.

Cable Address "Browning"

GOODELL-PRATT

1500 GOOD TOOLS

BREAST DRILLS 27 SIZES AND STYLES With Many Refinements

GOODELL-PRATT Breast Drills are well-known and very popular throughout the world on account of their uniform excellence of construction, the many time and labour-saving refinements, the careful fitting of the various parts, and the fine finish.

Breast Drill No. 6 has steel pinions, two-speeds, changed by a strong, perfected shifting device, and an all-steel chuck with hardened jaws.

MADE IN AMERICA

Have you the genuine Goodell-Pratt "Made in America" Breast Drill in stock? It is known and easily distinguished by the big, red gear.

CAREFULLY PACKED FOR EXPORT

All Goodell-Pratt tools are packed with the greatest care to insure adequate protection for export shipment.

FREE CATALOGUES

Goodell-Pratt products are carried in stock by most importers of American tools, who will be glad to supply you with a catalogue in either English, French, Spanish or Russian, and see that your tool requirements are quickly and accurately filled.

BREAST DRILL
No. 6

GOODELL-PRATT COMPANY — *Toolsmiths* — Greenfield, Mass., U.S.A.

SOUTH MANCHURIA RAILWAY

MANCHURIA AND CHOSEN LINES

Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul and Dairen and Changchun), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least twice a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

SOUTH MANCHURIA RAILWAY COMPANY

Head Office: DAIREN

Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

Telegraphic Address: MANTETSU or SMRCO. Codes: A.B.C. 5th & 6th Editions, A1 Lieber's, and Bentley's

BALDWIN

Quality Insures Service

Governments and Industrial Corporations about to place orders for motive power of any type should give the most careful study and attention to design and equipment. Baldwin Industrial Locomotives are known throughout the entire world by reason of correct design, especially suited to the requirements of service.

SIX-WHEELED SHUNTING ENGINE BUILT FOR HOKKAIDO, KOGYO TETSUDO, K.K. (JAPAN)

Guage, 3 feet 6 inches; Cylinders, 13 inches × 20 inches; Working pressure, 170 pounds; Fuel, soft coal; Driving wheels, diameter, 40½ inches; Weight, 72,700 pounds.

In the shunting engine illustrated, a few of the characteristic Baldwin features are as follows:—

Accessibility of all parts for repair or replacement.

Convenience in cab for engineman and ample room for firing.

Low center of gravity. Can be safely operated over rough and uneven tracks and sharp curves.

Exceptionally well equalized. Can be operated with minimum injury to tracks.

Tires are of a specially hard material best adapted for maximum life to both tread and flange.

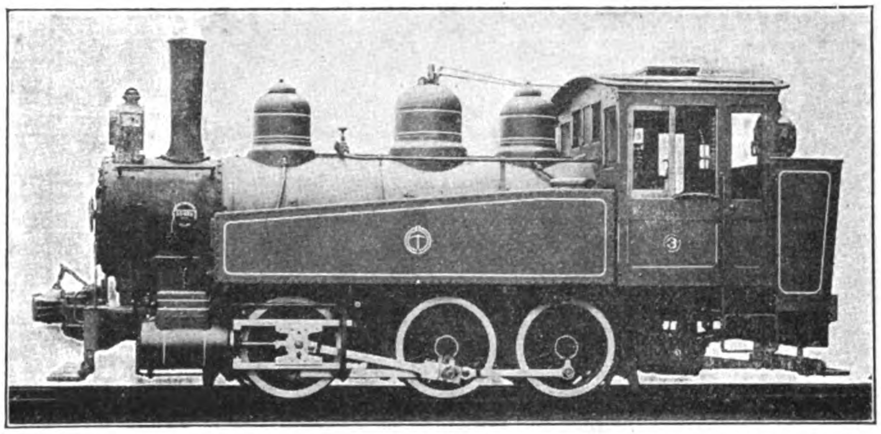
Springs conveniently placed on short saddles directly over the journal boxes and connected with equalizing levers in the same plane.

Bar frames are of extra heavy section. Their "open" character adapts them especially to the convenient placing of equalizing levers and machinery.

Unusually large journals for driving axles and crank pins, insuring maximum life with minimum wear.

A balanced throttle with a latched lever. This type is more positive and convenient than the slide throttle and rotating crank.

Side tanks are sloped forward to give the driver a clear view ahead when coupling or manœuvring.



SIX-WHEELED SHUNTING ENGINE BUILT FOR HOKKAIDO, KOGYO TETSUDO, K.K. (JAPAN)

Both hand and steam brakes are provided. The Baldwin steam brake is the most efficient yet devised.

Lubrication is by condensing sight feed lubricator in the cab, giving positive and economic operation. This system will be found superior to lubrication by mechanical means. All oil cups on wearing parts are easy of access.

Rocking bar type grates are easy to operate and economical of fuel.

A most important feature of Baldwin construction which will appeal to purchasers of motive power is that all materials used are in accordance with the specifications of the American Society for Testing Materials, an association of international repute. This insures highest quality. Our nearest representative is at your command at any time.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U.S.A. Cable Address: "Baldwin, Philadelphia"

SALE & FRAZAR, LTD., Tokyo and New York
J. M. WRIGHT, Bandoeng, Java, D. E. I.
C. BREWER & CO., LTD., Honolulu, Hawaii
NEWELL & CO., Melbourne, Victoria
ANDERSEN, MEYER & CO., LTD., Shanghai and New York
PHILLIPS & PIKE, Wellington, New Zealand
R. TOWNS & CO., Sydney, New South Wales
LESLIE & CO., Perth, Western Australia
PACIFIC COMMERCIAL CO., Manila, P. I., and New York
J. W. KELKER, Harbin, Manchuria

854

LOCOMOTIVES

JAPANESE GOVERNMENT RAILWAYS

THOROUGHLY EQUIPPED LINES REACH EVERY PLEASURE RESORT AND BUSINESS POINT

Reserved Cars, Private Cars, Special Trains on Previous Arrangement for Tourists' Parties of all Sizes

WELL-FURNISHED PASSENGER CARS WITH SLEEPING AND DINING ACCOMMODATION ON THROUGH TRAINS AND EXPRESSES

TWO MOST RELIABLE ORGANIZATIONS FOR TRAVELLERS

1. JAPAN TOURIST BUREAU
   Peking Office: Morrison Road, Peking
   Head Office: Tokyo Station, Tokyo, Japan
2. JAPAN HOTEL ASSOCIATION
   c/o Traffic Bureau, Japanese Government Railways

For Particulars, Time-Tables, Guide Books, etc., please apply to
TRAFFIC BUREAU, DEPARTMENT OF RAILWAYS, TOKYO, JAPAN

THROUGH BOOKING TO AND FROM

CHINA

Single and Return Tickets between China and Japan via Chosen
Period of Validity: Single, 40 days: Return, 110 days. 20% Reduction for Return Tickets

China-Japan Party Trip Tickets
Period of Validity: Two months. Reduction: 25%-50% for 10 or more passengers

China-Japan Circular Tour Tickets
Period of Validity: Four months. Reduction: 30% for Railway; 25% for Steamer

China-Japan Parcel Through Traffic
Parcel through conveyance between the principal stations in China and Japan viâ Chosen at low rates

OFFICIAL GUIDE-BOOKS TO EASTERN ASIA—ISSUED BY THE JAPANESE GOVERNMENT RAILWAYS, TOKYO, JAPAN.

			In the Far East
Vol.	I.	Chosen, Manchuria, Siberia (Revised Edition) ...	10 Yen
„	II.	South-Western Japan	5 Yen
„	III.	North-Eastern Japan...	5 „
„	IV.	China (Revised Edition)	10 „
„	V.	East Indies	7 „

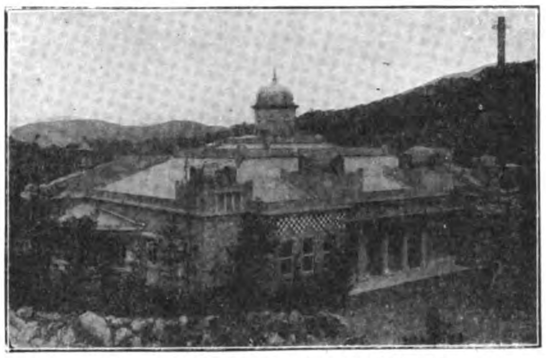
On sale at the best bookstores and principal tourist agencies in the United States, Canada, Great Britain, the principal Continental countries, and throughout the Far East.

"THE HOT SPRINGS OF JAPAN"

(AND THE PRINCIPAL COLD SPRINGS)

INCLUDING

CHOSEN (Korea); SOUTH MANCHURIA; TAIWAN (Formosa)



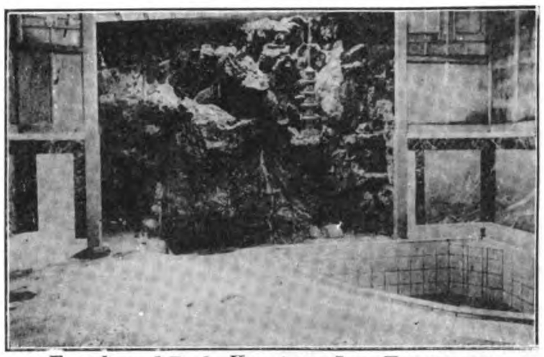
Arima. Radium Spring Bath-house

OFFICIAL SERIES

Issued by the

JAPANESE GOVERNMENT RAILWAYS,

Tokyo, Japan



Fan-shaped Bath, Kansiu-ro Inn, Tonosawa, in Hakone

A standard and comprehensive book that is a mine of information on hot springs, including analyses, lists of diseases *benefited* by the different classes of springs (diseases *prohibited* are also given), the routes to the springs, available hotel accommodations, places of interest at and near the resorts.

Owakidani or Ojigoku ("Big Hell") in Hakone

The book explains the action of the water on the human body, and contains other valuable and interesting information, including data, etc., of mineral springs in the principal countries of the world, and of radium springs.

Much of the information is applicable to mineral springs anywhere

504 PAGES; 196 ILLUSTRATIONS; 2 COLORED LITHOGRAPHS; 15 MAPS, SPECIALLY DRAWN

The book slips into the pocket easily. Price: 7 *Yen* in the Far East

The bookstores of the United States and Canada are supplied through Messrs. O. P. Putnam's Sons, 5 West 45th Street, New York. Those of Great Britain and the Continent through Messrs. G. P. Putnam's Sons, 24 Bedford Street, Strand, London, W.C. 2.

ON SALE IN THE FAR EAST

At all offices of Japan Tourist Bureau: Tokyo, Yokohama, Kobe, Nagasaki, and at Seoul, Tsingtau, Dairen, Harbin, Peking, etc.

At Kelly & Walsh: Yokohama, Shanghai, Hankow, Hongkong, Singapore.

Open Air Hot Spring Bath at Hsiung-yao-cheng, South Manchuria

At the Philippine Educational Co., Manila.

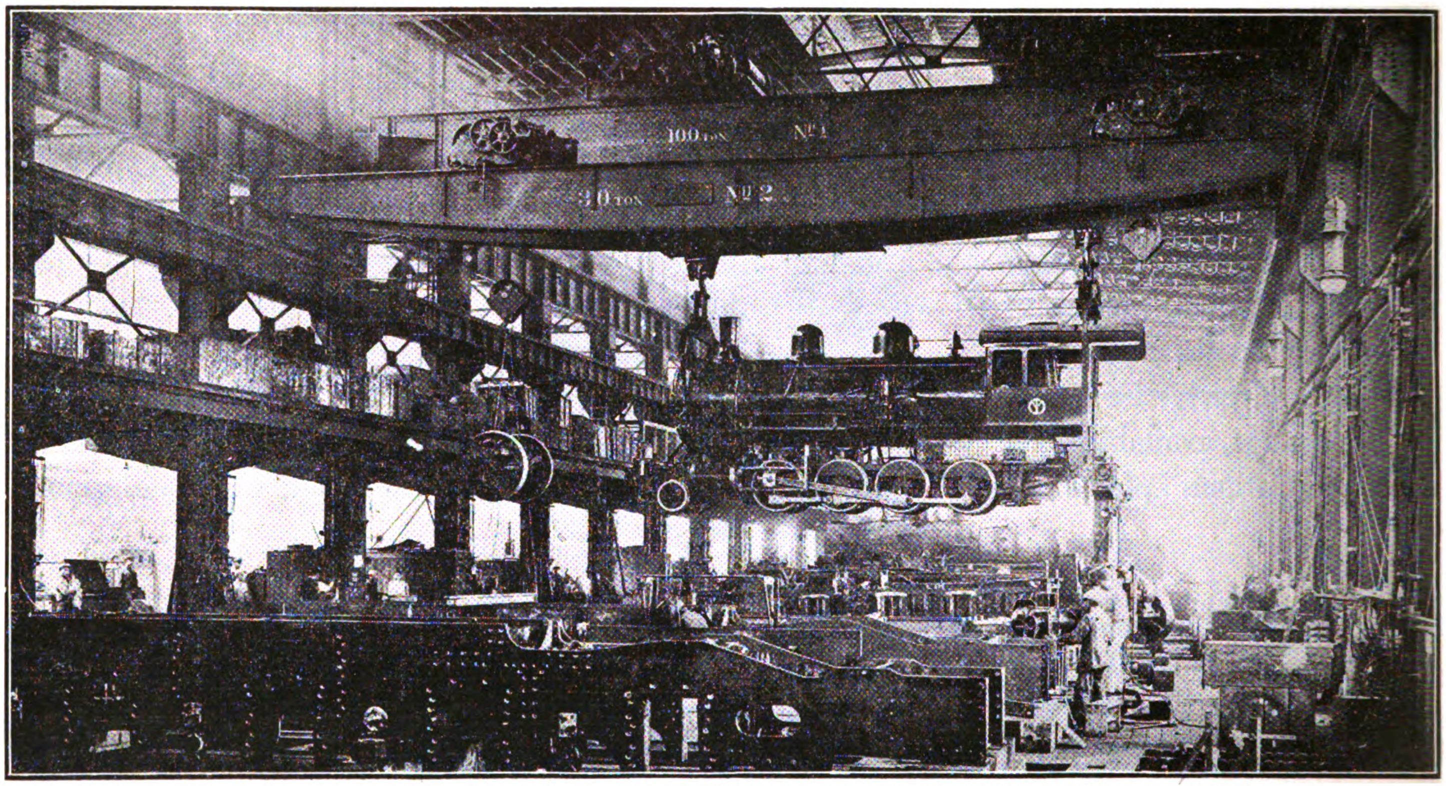
At the leading bookstores in Tokyo and elsewhere in Japan and in China.

At the principal Thos. Cook & Son's offices throughout the World.

SOUTH MANCHURIA RAILWAY

RAILWAY

SHAKAKO WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

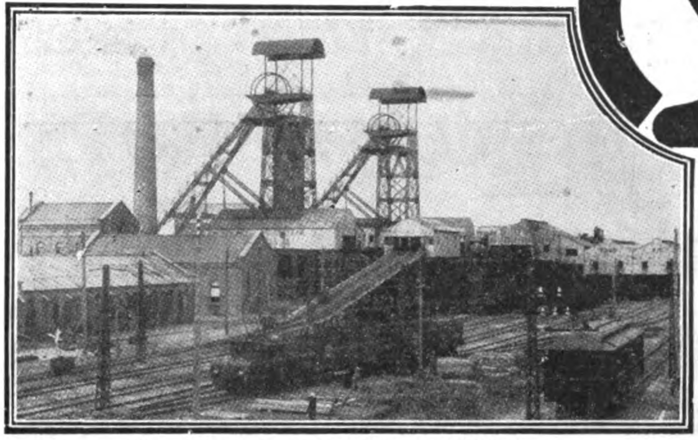
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

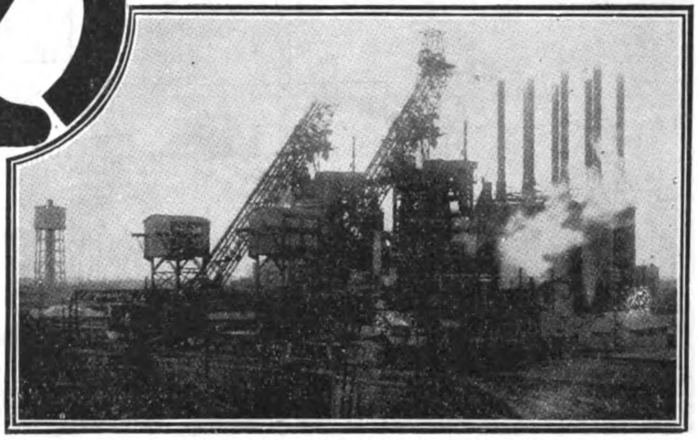
THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON



Togo Pit of the S.M.R. Fushun Collieries



Anshan Steel Works of the S.M.R.

FUSHUN COAL

The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

Depots:

Dairen · Port Arthur · Newchwang (Yingkou) · Tientsin · Tsingtao

Agencies:

Chefoo	Takao (Formosa)	Osaka
Manila	Batavia	Nagoya
Hongkong	Yokohama	Shanghai
Sourabaya	South Seas	Moji
Singapore	Niigata	Saigon
Penang		etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day) Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day) Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

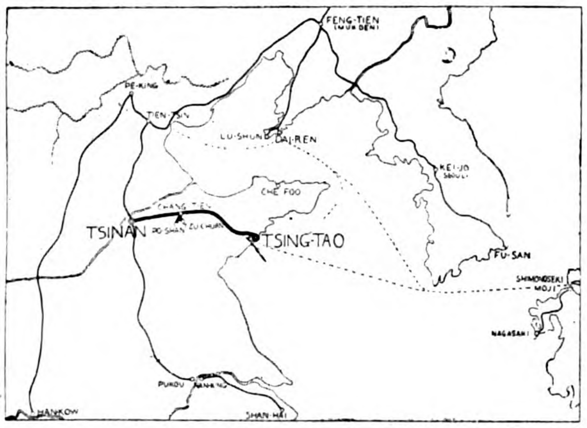
A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

BUT THE TWAIN HAS MET AND BLENDED HERE

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.
For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.
Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway.
At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.
The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1 leaves Tsingtao daily 10.00 p.m. arrives Tsinan 8.00 a.m.
Train No. 3 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.40 p.m.
Train No. 2 leaves Tsinan daily 11.00 p.m. arrives Tsingtao 8.35 a.m.
Train No. 4 leaves Tsinan daily 10.10 a.m. arrives Tsingtao 8.20 p.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30; 2nd class, $7.20.

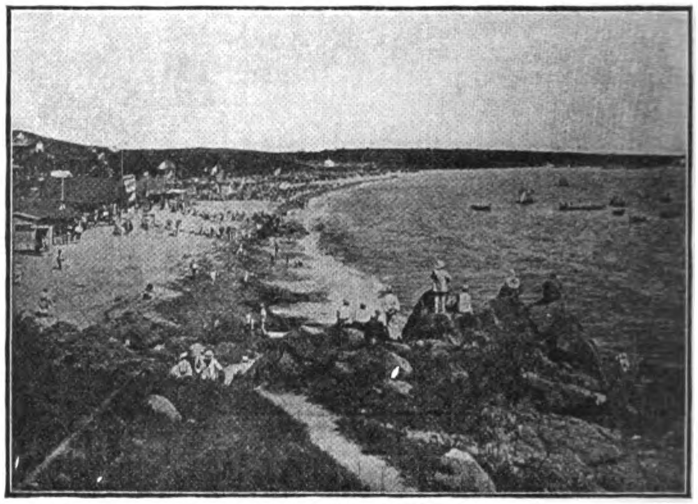
First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.



BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

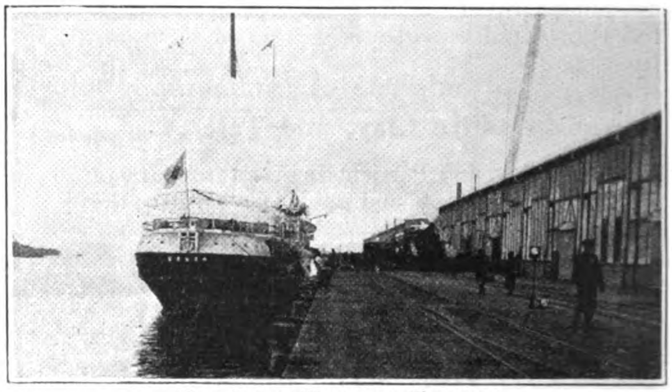
The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.



THE GREAT HARBOUR, TSINGTAO

For Further Information, please apply to

THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

SUPERHEATERS
ELESCO

STEAM SUPERHEATERS for Locomotive, Industrial and Marine Service
Feed Water Heater Equipment for Locomotives
Boiler Feed Pumps — Pipe Coils
Designing Engineers and Manufacturers

THE SUPERHEATER COMPANY

General Offices: 17 East 42nd St., New York, U.S.A.

PITTSBURGH STEEL CO.
Pittsburgh, Pennsylvania, U.S.A.
Manufacturers of "PITTSBURGH PERFECT"
OPEN HEARTH STEEL PRODUCTS
INCLUDING

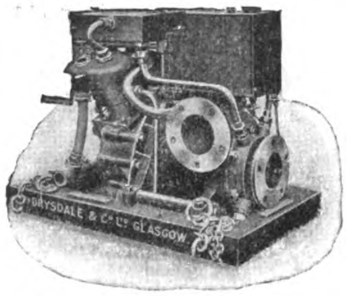
Galvanized Wire	Bolt and Rivet Wire
Bright Hard Wire	Galvanized Barbed Wire
Bright Nail Wire	Wire Nails
Annealed Wire	Fence Staples
Bright Soft Wire	

Pig-Iron, Blooms, Billets, Wire Rods, Hard Spring Coil Wire, Twisted Cable Wire, Bale Ties, Steel Hoops, Steel Bands, Cotton Ties and Fabricated Stock, Poultry and Lawn Fencing.

We are prepared to give PROMPT SERVICE, and solicit your inquiries accompanied by complete specifications.

ADDRESS:
PITTSBURGH STEEL CO.
EXPORT DEPARTMENT:
EQUITABLE BUILDING, NEW YORK, U. S. A.
Cable Address: "PITTSTEEL."

"BON ACCORD" **CENTRIFUGAL PUMPS**



FOR ALL PURPOSES
DRIVEN BY STEAM, ELECTRICAL, GAS. OIL, OR BELT POWER.

Illustration shews a 4" Portable Petrol Driven Pump easily carried by two men. Capacity 90 tons water P. Hr. Specially arranged for dealing with muddy water.

FOR MARINE SALVAGE
CONTRACTORS, IRRIGATION, FLOOD DRAINAGE, ETC., ETC.

DRYSDALE & CO., Ltd., Yoker, Glasgow
Tel. Address: Bonaccord, Glasgow

THE
FAR EASTERN MANUAL
FINANCE — INDUSTRY

This publication will contain the reports of all the Industrial and Manufacturing enterprises of importance in the Far East, including,

BANKS, INSURANCE, RAILWAYS, TRAMWAYS, MINES, ELECTRIC LIGHT AND POWER, TELEPHONES, WATERWORKS, DOCKYARDS, SHIPBUILDING, HARBOR WORKS, SHIPPING, COTTON, SILK, OIL, FLOUR, SUGAR AND OTHER INDUSTRIAL PLANTS

IN

CHINA, JAPAN, KOREA, FORMOSA, HONGKONG, SIAM, INDO-CHINA, MALAYA, NETHERLANDS INDIES AND THE PHILIPPINES

Sample pages on request

THE FAR EASTERN REVIEW, *Publishers*

G-E EDISON LAMPS

Are Dependable

All reliable dealers sell them

International General Electric Company, Inc.

NEW YORK
120 Broadway

SCHENECTADY
New York

Address all correspondence to nearest representative

Japan: International General Electric Company, Inc., Yokohama; Shibaura Engineering Works, Tokyo; Tokyo Electric Company Ltd., Kawasaki.
Philippines: Pacific Commercial Company, Manila.
Dutch East Indies: N. V. de Twentsche Handel Mij., v/h de Rooij en Co., Soerabaia, Java.
China: Andersen, Meyer & Company, Ltd., Shanghai.

General office for the Far East, excluding Japan and China: International General Electric Company, Inc., Shanghai.

AWARDED GRAND PRIZE OF HONOUR
PANAMA PACIFIC EXHIBITION, SAN FRANCISCO, 1915.
MOST POPULAR **BEER** IN THE ORIENT

ASAHI **YEBISU** **SAPPORO**

BREWED BY

THE DAI NIPPON BREWERY CO., LTD.

HEAD OFFICE: TOKYO
BRANCHES OSAKA, SAPPORO, SEOUL, SHANGHAI, TSINGTAO.
SOLD EVERYWHERE
Agents: MITSUI BUSSAN KAISHA,
China, Straits Settlements, Dutch East Indies, and British India

A. J. MORSE & SON, Inc.
221 High St., Boston, Mass., U.S.A.
Established 1837

DIVING APPARATUS

Special Apparatus built to order

FRANK L. STRONG, *Agent—24 Calle Echague, Manila, P.I.*

PUBLISHED ANNUALLY

THE LONDON DIRECTORY

with Provincial & Foreign Sections,
enables traders to communicate direct with

MANUFACTURERS & DEALERS

in London and in the Provincial Towns and Industrial Centres of the United Kingdom and the Continent of Europe. The names, addresses and other details are classified under more than 2,000 trade headings, including

EXPORT MERCHANTS

with detailed particulars of the Goods shipped and the Colonial and Foreign Markets supplied;

STEAMSHIP LINES

arranged under the Ports to which they sail, and indicating the approximate Sailings.

One-inch BUSINESS CARDS of Firms desiring to extend their connections or Trade Cards of

DEALERS SEEKING AGENCIES

can be printed at a cost of 30 shillings for each trade heading under which they are inserted. Larger advertisements from £2 to £16.

A copy of the directory will be sent by parcel post for 40 shillings nett cash with order.

THE LONDON DIRECTORY CO., LTD.

25 Abchurch Lane, London, E.C. 4, England

BUSINESS ESTABLISHED 108 YEARS

THE

North-China Daily News

Established in 1850 as a weekly; in 1870 as a daily

To the Reader

The "North-China Daily News" writes the history of China. It records the pulse of its politics; it reports the conditions of its finance and its markets; and it chronicles the daily doings of its people.

To the Advertiser

The greatest purchasing power in China is that possessed by readers of the "North-China Daily News." It is the newspaper which is found in every office, consular or commercial; it is the newspaper most frequently quoted both by the foreign and vernacular press; and it is the one newspaper which combines a quality with a quantity circulation—being the largest both in size and circulation in China. It was the first newspaper to publish audited circulation statements.

Subscription: Mex. $28 per annum.

(Postage Extra).

The North-China Herald

Is the weekly edition of the "North-China Daily News" for readers abroad. It contains 95 per cent. of news and is the best medium for keeping in touch with events in China when out of reach of the daily.

Subscription: Mex. $16 per annum.

(Postage Extra).

Copies of either of the above publications will be sent to anyone interested on request.

NORTH-CHINA DAILY NEWS & HERALD, LTD.,
Shanghai.

Telegraphic Address: "Herald Shanghai."—All Codes.

A NORTH-CHINA TRADE DIRECTORY

The North China Desk Hong List

Is the only Trade Directory of North China issued twice a year. Its information is the most accurate and complete. Published regularly since 1865 it has grown to 900 pages. In addition to the names and addresses of every foreign firm, resident, and missionary in China it contains the following classified information:—

SHANGHAI HONG LIST.—All firms, institutions, missions, consulates, etc., in Shanghai, with staffs, arranged alphabetically.

TRADE DIRECTORY.—A list of all Shanghai firms under their professional or trade headings.

AGENCIES.—Agencies held by Shanghai firms are listed alphabetically, with the firm's name after them.

STREET DIRECTORY.—A list of the streets of Shanghai in English and Chinese, with the occupants of all foreign and many Chinese houses, offices, and stores.

SHANGHAI WHO'S WHO.—An alphabetical list of the men of Shanghai, with their business addresses.

RAILWAYS.—A list of the Northern Railways of China, with their foreign and native staffs, including those resident in Shanghai.

RESIDENTIAL DIRECTORY.—A complete list of the foreign residents of Shanghai, arranged alphabetically, with their private addresses.

OUTPORT HONG LIST.—A list of Northern and Central China cities and outports with foreign firms and institutions and their staffs.

OUTPORT WHO'S WHO.—An alphabetical list of foreign men in Northern and Central China, compiled from the Outport and Railway Sections of this work.

OUTPORT LADIES' LIST.—An alphabetical list of foreign ladies, not engaged in mission work, resident in Northern and Central China.

OUTPORT MISSIONARIES.—Classified alphabetically by provinces. Under the names of the provinces are given the towns where missions are established, with list of residents. This is divided into two sections: (1) Protestants, (2) Roman Catholics. Mission Institutions, such as Schools, Colleges, etc., will be found under the respective Ports in which they are instituted.

MISSIONS WHO'S WHO.—An alphabetical list of missionaries of each denomination, compiled from the previous section.

GENERAL.—Consular, postal, exchange and other information.

PRICES:

Shanghai **$8** with map **$6** without map

On Sale at the Offices of

The North-China Daily News

(Temporary offices during rebuilding)

2B Kiukiang Road, Shanghai

D X N
TRADE MARK

Backed by Real Experience

Woven into the walls of DIXON CRUCIBLES are ninety-three years of successful crucible making.

Ever since 1827, when Joseph Dixon made the first successful "black-lead" crucible, this experience has accumulated until now it is a wonderful wealth of knowledge.

DIXON CRUCIBLES have, during these many years, maintained a standard of efficiency and quality that has made them the first choice of discriminating foundrymen, and to-day they are made with the same care and skill which won this unequalled reputation, plus the knowledge gained in nearly a century of experience.

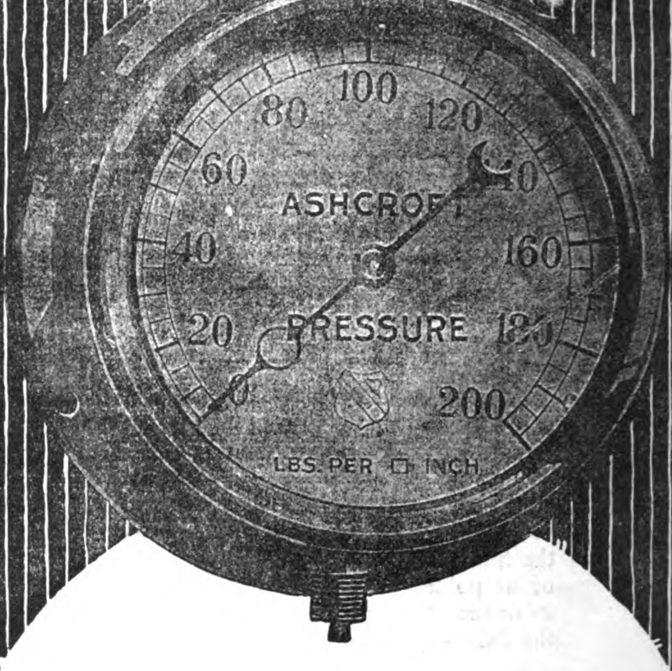
D X N
TRADE MARK

For Prices, Information, etc., communicate with

HENRY KATTEN

WALWORTH INTERNATIONAL CO.

22 Kiukiang Road Shanghai, China



THE ASHCROFT GAUGE shown above, is made with either drawn brass or pressed steel case and ring. The steel case is stronger than the brass and is finished with a black hard rubber finish which will not chip off, and which retains its fine appearance indefinitely.

Made for pressure, vacuum or compound,—in 2½", 3½", 4½", 5" and 6" sizes. Styles and connections made British or Metric standard.

Ashcroft Drawn Case Gauges represent the best [illegible] in gauge construction, and are built to combine accuracy and durability with high-class appearance.

Our agents are prepared to advise with you and quote prices. Consult them also, regarding Consolidated Safety Valves and Metropolitan Injectors, used for years by engineers the world over.

Manning, Maxwell & Moore, Inc.
119 W. 40th St.
New York
Agent for China:
Henry Katten, 22 Kiukiang Road, Shanghai, China
Agent for Japan: Horne Co., Ltd., 6 Takiyama cho, Kyobashi Ku, Tokio

ASHCROFT GAUGES

Capital (Fully Paid-Up):
Yen 100,000,000

Reserve Fund:
Yen 65,000,000

HEAD OFFICE, YOKOHAMA

CORRESPONDENTS
AT ALL
THE CHIEF
COMMERCIAL CITIES
IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: KENJI KODAMA, Esq.
Vice-President: REITARO ICHINOMIYA, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASUNOSUKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
SHIMAKICHI SUZUKI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
BARON KAISAKU MORIMURA
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.
HIROZO MORI, Esq.
KUNIZO MOGAMI, Esq.

Head Office: YOKOHAMA
Manager: N. IGARASHI, Esq.

TOKYO BRANCH
No. 1, Nichome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES.

Batavia	Dairen	Hongkong	Los Angeles (*sub-office of San Francisco Branch*)	Nagoya	Rangoon	Shanghai	Tientsin
Bombay	Fengtien	Honolulu	Lyons	Newchwang	Rio de Janeiro	Shimonoseki	Tsinan
Buenos Aires	Hamburg	Kaiyuang	Manila	New York	Saigon	Singapore	Tsingtau
Calcutta	Hankow	Kobe	Nagasaki	Osaka	San Francisco	Sourabaya	Vladivostock
Changchun	Harbin	London		Peking	Seattle	Sydney	

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application
Every description of Banking business transacted.
For particulars, apply to the managers.

大正七年七月十日第三種郵便物認可

KEYSTONE

COPPER STEEL

APOLLO KEYSTONE COPPER STEEL SHEETS
THE RUST RESISTING STEEL

THE CAUTIOUS, DISCRIMINATING BUILDER WILL INSIST UPON APOLLO-KEYSTONE

UNITED STATES STEEL PRODUCTS COMPANY

UNION BUILDING, THE BUND AND CANTON ROAD, SHANGHAI

Tokyo Office:
No. 15 Nakadori, Marunouchi

Peking Office:
No. 22 Wu Liang Ta Jen Hutung

Printed by the NORTH-CHINA DAILY NEWS AND HERALD, LTD., for the Proprietor.

UC SOUTHERN REGIONAL LIBRARY FACILITY
E 000 057 365 9